

EXHIBIT 1

The California Chaparral Institute

...the voice of the chaparral

FIRE & SCIENCE

Fire Suppression, Science, and Personal Opinion

When discussing an idea, it is usually best to ignore personalities and stick to the data. This is how science is supposed to work.

Well, there comes a time when a viewpoint becomes so disconnected from the accepted body of scientific knowledge that it distracts from constructive dialogue. At times it can even delay or alter important policy decisions. Such delays create negative consequences for future generations by creating unproductive, "my expert" vs. "your expert" politicized debates in the press. Although each of the experts are assumed to have equally valid viewpoints supported by objective data, one or more are solely interested in promoting their own individual cause or agenda regardless of the facts. Often these causes are pushed by narrow, special interests in a consciously dishonest manner. Or alternatively, the promoter honestly believes his or her own view of the world so strongly that he or she is unable to objectively evaluate contrary data. Instead, everything is seen in light of a favored theory and seemingly obvious contradictions are dismissed (often unconsciously). Consequently, when the cause is continually taken to the popular media instead of being objectively discussed within the framework of science, it becomes impossible to ignore the messenger. This is why a number of well-know fire scientists spoke out this year about [Thomas Bonnicksen](#) who was disregarding scientific fact to promote politically motivated policies dealing with wildland fire.

The June 16, 2007, San Bernardino County Sun news article "Forests Need to Burn" was a signal to many of us in the wildland fire and fire science communities that the time has come to directly address Richard Minnich's continual promotion of incorrect and potentially damaging notions about wildland fire management.

In summary:

In his insistence on focusing on only one variable (chaparral age), Dr. Minnich does not appear to have a clear understanding of wildland fire. Wildland fire risk in Southern California is not the fault of the fire service, or the result of old stands of chaparral, it is an inherent part of the landscape. Laying more fire on the ground on a landscape level or allowing fires to run is unacceptable in Southern California for both safety and ecological reasons. The Baja California fire mosaic model originally described in 1983 and elaborated in 1997 is not applicable to Southern California. The best and most efficient way to reduce wildland fire risk is through proper community design, fire-safe building construction, adequate vegetation management around structures and strategically placed fuel treatment projects.

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The Baja-Southern California Fire Model

Or, what's the story behind that map showing such big differences between wildfire size in Baja compared to Southern California?

It is a common perception that wildlands are unnaturally overgrown with a half-century's worth of highly combustible brush and small trees because of successful firefighting efforts since the 1950s. In addition, environmental groups and government regulations are often blamed for preventing thinning and prescribed burns to help alleviate this buildup because of misguided priorities. Such oversimplifications of a very complex problem are not helpful in finding solutions. They also have nothing to do with California's most characteristic wildland, the chaparral.

It does appear that some, but not all, of our nation's forests are unnaturally overgrown, a consequence of past logging and grazing practices as well as fire suppression efforts. However, without understanding the dramatic differences between forests and the chaparral-covered hillsides in California, some are promoting a single solution to deal with the threat of wildfire everywhere. This will not only lead to inappropriate use of scarce resources, but will do little to prevent the kind of firestorms southern California experienced in 2003 and 2007.

The notion of performing controlled burns to alternate patches of backcountry chaparral as a way to prevent wildfires is the basic tenet of the Baja-Southern California Fire Model first suggested by Richard Minnich of UC Riverside in 1983. This model is based on the hypothesis that the size of wildfires north of the Mexican-Californian border are larger than those in Baja because of dramatically different fire management strategies.

According to this theory, a century of fire suppression in Southern California has caused an "unnatural" accumulation of brush that has consequently led to large, destructive chaparral fires. A map showing small fire perimeters south of the border and large ones to the north is often used as supporting evidence.

The map is convincing and the logic appears reasonable. However, after being tested by a diversified group of scientists over the past ten years, the Baja-Southern California Fire Model fails for a simple reason. It ignores a significant number of important variables.

Scientifically, the comparison between southern California and Baja is problematic because of variations between the two regions as well as how the data was collected. Baja is much drier, has different soil types, and is not subject to the same Santa Ana wind conditions as Southern California. In addition, the Baja landscape has been heavily damaged by ranchers who consistently burn back natural vegetation in order to increase grasslands. It is difficult to find an area south of the border that does not show signs of grazing activity.

The other important factor to consider in the Baja comparison is how fire perimeters were determined. In California, fire size is recorded and mapped by state

agencies. Such detailed records do not exist in Baja. Instead, fire perimeters in Baja have to be estimated by LANDSTAT satellite images and subjective, on the ground measurements. These create two completely different data sets which are consequently difficult to use for any comparative analysis. In addition, smaller fires that were extinguished by firefighters in California before they became large ones were left out of Baja/California comparisons.

Extensive research by J.E. Keeley and C.J. Fotheringham has shown that burn patterns have not changed significantly in Southern California since 1878. The California Statewide Fire History Database clearly indicates that since 1910, the mean size of fires in San Luis Obispo, Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside and San Diego counties has remained constant. The timing of fires is equally consistent, with most igniting June through November with September representing the most flammable period ([reference #1](#)).

In a study by S.A. Mensing and others, seabed charcoal deposits off the coast of Santa Barbara County have shown that the frequency of large, Santa Ana driven fires has not changed over the past 500 years (see [reference #2](#)). Similar results are produced even when comparing years before and after 1950 when advanced fire suppression technology was developed and utilized on a massive scale. The only important change revealed by these studies has been an increase in fire frequency during modern times, not a decrease.

Fire in chaparral is a natural, unpreventable event. Despite all our efforts to control them, large chaparral fires have continued unabated since our arrival in California. The assumption that old stands with an "unnatural accumulation of old brush" encourage fires to spread and become more dangerous is inaccurate. Studies by M. Moritz and others have shown that fuel age does not significantly affect the probability of burning. These findings analyzed some of the same data used in the Baja Model ([reference #3](#)).

P. Zedler examined the same question through mathematical modeling and arrived at the same conclusion. Under Santa Ana conditions, fire rapidly sweeps through all chaparral stands, regardless of age. Once the flames start, everything burns (see [reference #4](#)).

Years of fire suppression have not been successful in excluding fire in chaparral landscapes. Relying on non-strategic prescribed burning in the backcountry in order to create mosaics of "mixed-aged stands" will likely prove to be equally frustrating ([reference #5](#)).

What is the solution then?

The first task is to objectively examine the research. Unfortunately, fire management has become increasingly politicized. Instead of scientifically analyzing the data, some have the tendency to personalize the discussion and assign names or labels to particular positions. This is not only counterproductive, but confuses the public about how science is supposed to work. There are no positions. There are only collections of observations and facts with conclusions being derived from such data. By looking at the methods, the scientific design, and underlying assumptions, it becomes relatively easy to determine whether or not ignored variables or biases have influenced the results.

Another challenge is to implement fire-safe community planning and long term education programs to help maintain the public's fire vigilance. Unfortunately, developers will continue to be allowed to push farther into the backcountry as the population continues to grow. Homeowners will become complacent again as time goes

on and allow fire-prone vegetation to slowly accumulate next to their homes.

The best way to reduce the damage of wildfires is to allocate scarce fire management resources at the urban interface between development and chaparral and develop strict building codes reducing wildfire risk. This includes new regulations requiring the removal of fire dangers present now such as wood shake roofing and volatile pine and Eucalyptus trees near homes, designing fire-safe vents for attics, and carefully performing strategic vegetation management directly around communities.

Leave the rest of the landscape alone.

Cited References

[See our bibliography for more](#)

You will need Adobe Acrobat to read the referenced papers below. You can go to their site to download if you don't have it.

#1 Keeley, J.E., Fotheringham, C.J., Morais, M. 1999. Reexamining fire suppression impacts on brushland fire regimes. Science Vol. 284, Pg. 1829-1832.

#2 Mensing, S.A., Michaelsen, J., Byrne. A 560 year record of Santa Ana fires reconstructed from charcoal deposited in the Santa Barbara Basin, California. Quaternary Research. Vol. 51:295-305.

#3 Moritz, M.A., J.E. Keeley, E.A. Johnson, and A.A. Schaffner. 2004. Testing a basic assumption of shrubland fire management: Does the hazard of burning increase with the age of fuels? Frontiers in Ecology and the Environment. 2:67-72.

#4 Zedler, P.H., Seiger, L.A. 2000. Age Mosaics and Fire Size in Chaparral: A Simulation Study. In 2nd Interface Between Ecology and Land Development in California. USGS Open-File Report 00-02, pp. 9-18.

#5 Keeley, J.E. 2002. Fire management of California shrubland landscapes. Environmental Management 29: 395-408.

Below are the four seminal papers dealing with the entire Baja California fuel mosaic model. The original paper describing the model in 1983 is listed first. Then a detailed analysis with responses published in the December 2001 issue of Conservation Biology. Dr. Minnich has not responded to the final analysis and response in paper #4.

#1 Original Baja-Southern California Fire Model paper by R. Minnich. Fire Mosaics in Southern California and Baja California (1983).

#2 Analysis of Baja-So. Cal Fire Model. Historical Fire Regimes in Southern California Shrublands. J.E. Keeley and C.J. Fotheringham (2001).

#3 Minnich: An integrated model of 2 fire regimes (response to Keeley/Fotheringham from paper #2).

#4 Keeley and Fotheringham: History and Management of crown-fire ecosystems: a summary and response (to Minnich).

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EXHIBIT 2

CANYON POLICY PORTFOLIO

Pre-Release



Photo: Todd Stands

Our Financially Rewarding Natural Wildlands

BUILDING INCENTIVE FOR BETTER CANYON STEWARDSHIP

For in the end, we will conserve only what we love.

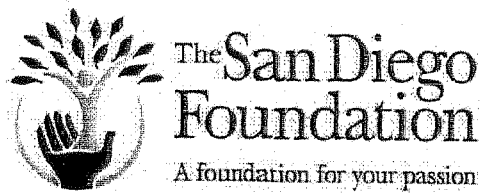
We will love only what we understand.

We will understand only what we are taught.

— Senegalese environmentalist Baba Dioum

For
The Citizens of San Diego

With generous funding from



Compiled by

The 32nd Street Task Force



with enormous assistance from

L. C. Burnett, Chris Sholley, Kay Stewart, Brandon Hanks, Megan Midgley, Ivana Medved, Rama Griffith, Louis Hock, Max Affarano, Demetrio Duran, Steven Haley, Tracey Hughes, Pati Johnson, Mike Klein, Josh Langham, Gary Moll, Eric Ray, JB Ruhl, Gabriele Wienhausen, Jenny Nimnual, Mike Klein, Phyllis Chapin, Scott Kessler, Chris Zirkle, James Nagelvoort and other City of San Diego staff.

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Canyon Policy Portfolio

Part I

Wildfires and Brush Management Practices in the City of San Diego



An Analysis

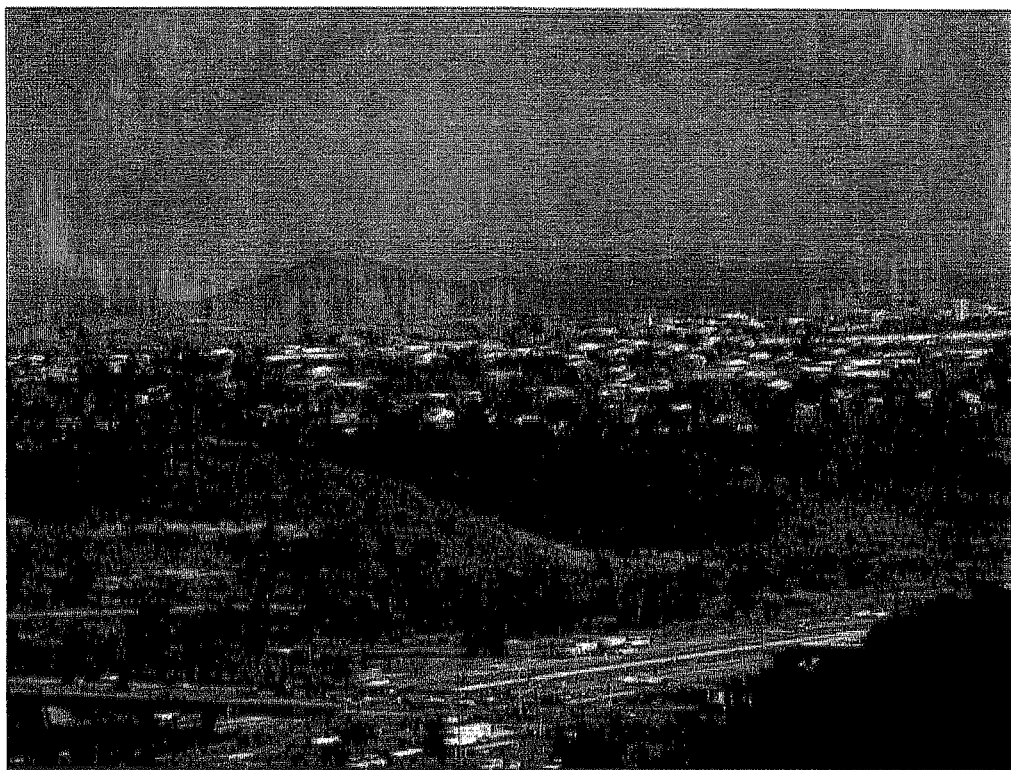
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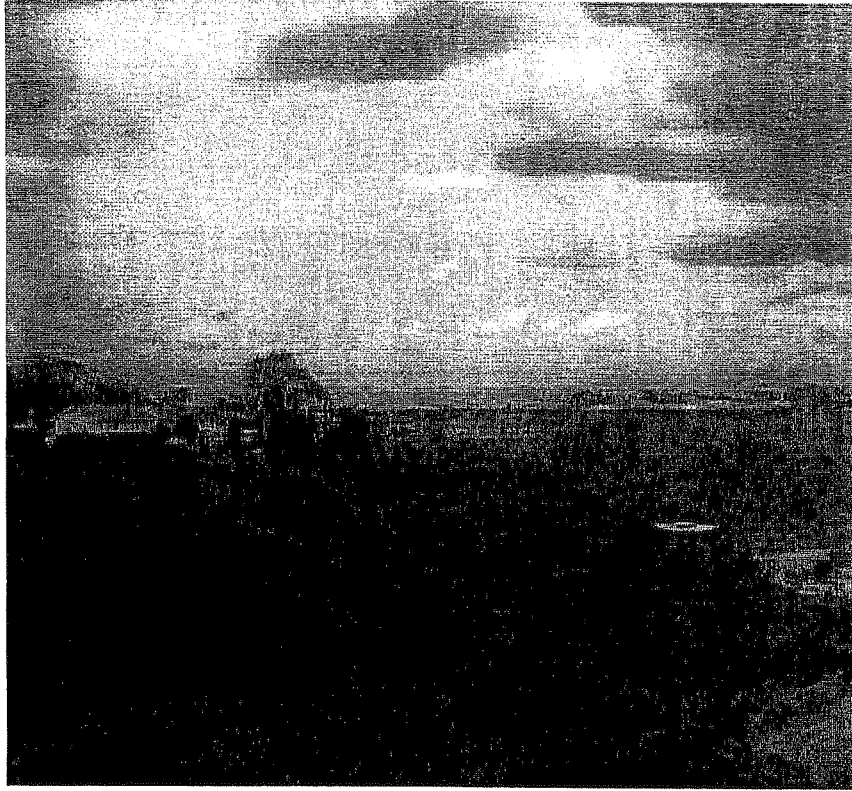
32nd Street Canyon Task Force

in cooperation with Kay Stewart, The San Diego Fire Recovery Network, California Native Plant Society/San Diego, Jenny Nimnual and staff from the City of San Diego

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Introduction

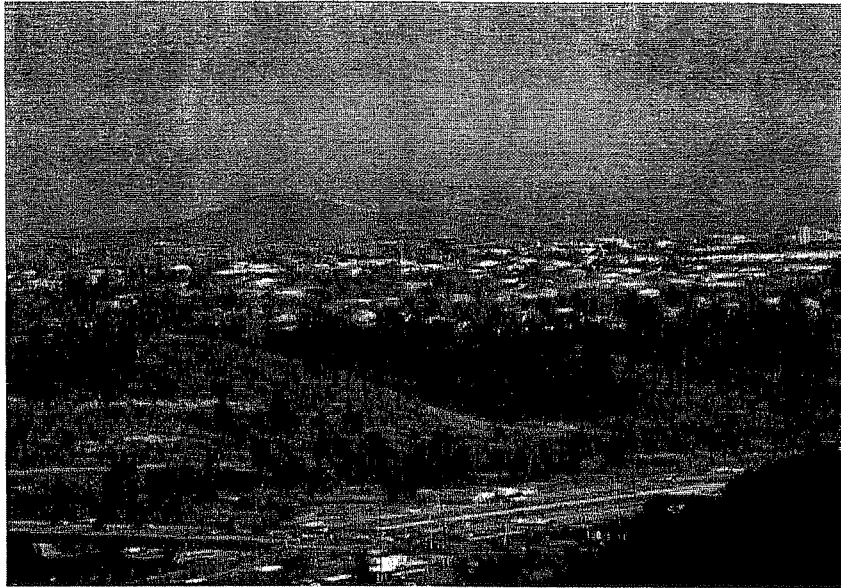
Over the millennia, San Diego's native landscape evolved to thrive with an average of ten inches of rain per year, and intermittent wildfire. This tough natural vegetation sheltered and fed upland wildlife. It produced fresh air, and sustained wetlands. It held down the soil and kept out the weeds. Filtered through canyons, stormwater runoff fed bountiful marine resources with organic nutrients.

Well, no more, because urbanization interrupted this balance and we humans have yet to establish our equilibrium with nature.

Unrestrained by sustainability regulations, people have imposed new contours, landscape and uses on land without weighing the consequences. As a result, we have urban ills with which we are all familiar. These include increasing air and water pollution, dwindling wildlife, dying marine environments, loss of recreation and quiet...*and dangerously frequent wildfires.*

California's exploding population growth has put exponentially more homes and workplaces next to wild landscapes, often called "wildlands." Urbanized lands in the city of San Diego expanded 39% between 1985 and 2002, jamming 30,977 acres of development on flat mesas or valleys, right up against sloping canyons that are too steep

for buildings or for roads.¹ This amounts to 900 lineal miles of homes on the edge of wildlands.²



This same population growth puts more sources of fire next to those wildlands. A century of records show over 95% of fires in Southern California have been caused by people, either through carelessness or arson. Simply put, more people cause more fires where nature and development intersect at the wildland-urban interface (WUI).³

Without rigorous analysis, the City of San Diego chose to focus public and private assets, not on reducing the flammability of existing structures, but principally on expanding vegetation fuel management at the fragile and controversial WUI.

Analysis of recent fires, as well as fire prevention and response history, suggests that civilization may have pushed both nature and development to their limits, wildfire-wise. "Neither our strategy nor our priorities have changed," said Mark Rey, the undersecretary for natural resources and the environment at the Department of Agriculture, the parent agency of the U.S Forest Service. "What has changed," he said, "is growth in the number of people living in harm's way. That has bumped up costs, because defending structures is inherently more expensive than wilderness firefighting."

The costs just keep rising. After every severe wildland fire of the last half century, including the Cedar Fire of 2003 and the recent fires, devastated and fearful homeowners, insurance companies, and firefighters demanded that public agencies reduce wildfire risks. Although known to be an essential part of fire-risk reduction, enforced retrofitting of at-risk buildings within 300' of the WUI (i.e. the very

¹ *San Diego Urban Ecosystem Analysis*, American Forests, 2002

² City of San Diego Brush Management Regulations, Bulletin #1, Brush Management Guide, 2006.

³ "San Diego Fire History," <http://www.sdfirerecovery.net/docs/FireHistorySDNHMfinal.xls>

objects needing defense) would have a high cost. Politicians were reluctant to require these changes. On the other hand, “brush management,” a catch-all term for manipulating fuel in plants, offered a less politically charged avenue for responding legislatively to the disastrous fires. Without rigorous analysis, the City of San Diego chose to focus public and private assets, not to reducing the flammability of existing structures, but principally on expanding vegetation fuel management at the fragile and controversial WUI.



“Easier to blame a bunch of shrubs for the fires than the developers and homeowners. Shrubs don’t vote or donate to political campaigns.”

The City of San Diego’s risk-reduction actions were as follows:

1. Invest in some fire suppression tools such as helicopters.
2. Change regulations to require *newly permitted* structures and landscapes near the WUI to use approved products and configurations that reduce combustibility. These standards apply *only* to new construction, not the tens of thousands of existing structures already built near canyons.
3. Legislate Brush Management Ordinance revisions and modify Brush Management Guidelines with the hope of creating affordable, sustainable low-fuel conditions and therefore low fire risk, while having a negligible impact on natural resources. The principle change was to make the area to manage fuels 100’ wide instead of the variable widths (30’ to 100’) required in the past. The revisions were adopted on September 19, 2005 in Ordinance Number O-19413.⁴ The comprehensive Brush Management Ordinance, which is part of the Land Development Code in the San Diego Municipal Code, is appended to this report.

In short, “brush management” was represented as the cheapest and most effective pre-fire management priority for a population needing real solutions to high fire risks.

This report will discuss the consequences of this decision, including a review of research on the effectiveness of WUI fuel management in reducing risks, the City Ordinance’s intent, how it is put into practice, and its costs and benefits.

⁴ City of San Diego Municipal Code; City of San Diego Brush Management Regulations. “Bulletin #1: Brush management guide for private property” Revised Oct. 10, 2006.

Overview of Concerns with Brush Management in San Diego Canyons

The City of San Diego actions, and the media coverage, have made brush management appear synonymous with fire-risk reduction. The public's sense of security and peace of mind may be assuaged by this perception. However, many of those who study and defend wildlands and their benefits (not just to other species but also to humans), have doubts and apprehension about the emphasis on brush management, and the revised Ordinance. These concerns are as follows:

1. The fire safety Ordinances fall short of the public's needs for significant reductions in fire risk, since they do not address:
 - a) The need for risk-reducing structural changes to *all* homes near canyons, which account for 60% of fire risk in most California communities.⁵
 - b) The need for risk-reducing landscape changes to existing older landscapes,
 - c) The growth of "flashy fuels" (fast-growing weeds) after brush management,
 - d) A brush management implementation strategy, which assures that skilled, trained crews will do the work required correctly and thus reduce risks
 - e) On-going funding to continue brush management.
 - f) The impact of irrigation, per the Guidelines, on risk.
2. No monitoring program will document if the process in fact reduces fire risk.
3. The Guidelines are too complicated to implement except by very knowledgeable, careful, and therefore expensive crews.
4. Existing staff are not responsible for training to reduce errors, and erroneous implementation is not penalized. Despite the Memorandum of Understanding with resource agencies, fire marshal notices do not distinguish sensitive lands nor enforce implementation to mimic the Guidelines, so impacts are not monitored. The risks are known: expert testimony on the impact of extensive thinning for fuel management in coastal sage scrub in Los Angeles County indicates that it results in slow death of the plant community, for instance.⁶

In a 1997 Memorandum of Understanding between the Fish and Wildlife Service of the United States Department of the Interior, the California Department of Fish and Game the San Diego County Fire Chief's Association and the Fire District's Association of San Diego County stated that the Department finds that implementation of the fire control, abatement and protection measures contemplated is not likely to result in jeopardy to the continued existence of the identified State listed or candidate species, if the terms and conditions of the MOU are fully implemented and adhered to. The Department finds, further, that by preventing or limiting the spread of fire to the identified species' habitat, this MOU will serve to protect the identified species from further degradation.

5. The Guidelines pointedly note that any wooden structure (such as decks, gazebos and fences) in Zone 1 not having a 1-hour fire resistance rating or built of

⁵ San "Diego Fire Recovery Network speech given in 2005 by Steve Quarles, UC Berkeley Fire Lab:UC Richmond Field Station: Steve Quarles UC Cooperative Extension Advisor Office: (510) 665-3580 E-mail: steve.quarles@nature.berkeley.edu.

⁶ San "Diego Fire Recovery Network speech given in 2005 by Klaus Radtke, author of WI-I. 1983, Living more safely in the chaparral-urban interface. Gen. Tech. Rep. PSW-67, Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station, 51 pp.

combustible materials must be removed. To date, we know of no enforcement actions with regard to this fire risk concern.

6. The potential loss of "ecosystem services" (i.e. expense-related benefits of shrub lands) has not been analyzed and may prove irreversibly costly.

In sum, concerned citizens are not convinced that the City's brush management methodologies and practices will save homes or diminish fire-fuel in a sustainable way; nor do they feel that fuel-reduction will be achieved without significant environmental damage. Clearly, it is time to look at the subject carefully and conscientiously.



Poised to perceive the naked truth about canyons and fire.

The Science of Fire Risk Reduction

Better science can point to the most effective means to reduce risks, as well as improve land-use, construction, pre-fire prevention, and fire response. A body of sound research that examines the relationship between fires, shrub-dominated ecosystems and their urban interface is emerging.

Every local agency has agreed that homes, workplaces and other structures are at lower risk with wider managed setbacks from canyons with wild vegetation; hence new developments have larger setbacks than older ones. More problematic are the practices needed to manage the structure, landscape, and wildlands that lack these pre-development boundaries to be what is sometimes called "fire safe."

To help City staff and advocates, the *Canyon Policy Portfolio* analysis defined criteria that could best determine the merit of long-term management choices as follows:

- a) Proven effectiveness,
- b) Achievable, affordable quality-controlled implementation,
- c) Priority relative to other effectiveness-gauged approaches + cost,
- d) Cost and frequency of implementation,
- e) Impacts on sustainable ecosystems (including legal obligations to the MSCP) and potential and/or likely costs of those impacts and vulnerability to litigation,
- f) Impacts on ecosystem services (i.e. water quality, air quality, energy conservation, etc.) and costs of those impacts, and
- g) Availability of on-going funding sources

Investigation suggests that these criteria were inadequately addressed by the City of San Diego's actions following the Cedar Fire of 2003, to the detriment of ecosystem services and public safety, and at unnecessary cost to taxpayers.

"Fire-safe" is a doubtful term if there ever was one, because the science of pre-defending a home from risks is still evolving. The fire science specialist's estimated that 60-70 percent of the risk of typical California structures igniting is due to construction weaknesses that permit ignition from one of the following three causes:

1. Direct flame striking the structure;

2. Extremely hot air (radiated heat) causes windows or other parts of the structural envelope to fail thus letting in embers; or
3. Embers lodge on a structure or nearby combustible object, or embers are sucked into the structure through any unscreened opening, thus igniting the structure.



Burned The rubble left by a wildfire in San Diego County, Calif.

The Cedar Fire and recent 2007 fires bore this out. Many photos showed burned houses surrounded by still viable vegetation.

Post-fire evidence showed that many homes ignited from flaming wooden fences and decks that then breached flammable siding causing “piloted ignition” of the homes. Embers landed on wooden roofs or siding, and ignited them, or embers entered through unprotected openings including garage or service door voids, or windows that were not closed when people evacuated. Skylights, doors or windows buckled in winds 200 degrees or more in temperature because they not designed to resist the difference between inside and outside temperatures. In theory, if those aspects of a dwelling are retrofitted with appropriate materials and installed correctly, risk would be reduced in a typical California home, provided it is closed up tight when a fire front hits the adjacent wildlands.

Another large number of homes were consumed when flammable plant debris, wood piles, furniture, fencing, awnings, and flimsy wood structures near homes ignited from embers long after the fire front had passed, and these flames were large enough to breach house walls and ignite the homes. This risk can be reduced by managing the home site in

the thirty to fifty feet out from the house, by keeping plants and trees free of dead branches and leaves, and replacing fabric and flammable wood furniture, fences, etc. with non-combustible materials. However, unless the structure has been improved to reduce combustibility, it is clear that improvements in the home landscape are no guarantee of safety. Both must be done well, or a structure is still at great risk. Nearly 3.2 million homes are classified at "very high" or "extreme" risk of wildfire.⁷

A U.S. Forest Service report on the Tahoe fire confirms that homes were set ablaze by embers from other buildings. "It wasn't flaming trees that ignited many of the 254 homes lost in the Lake Tahoe wildfire in June; it was other burning houses."⁸ Again, unless a structure has been improved to reduce combustibility, improvements in the landscape are no guarantee of safety. Both must be done well, or a structure is still at risk.

Numerous studies found that removing shrubs beyond a fairly small perimeter was much less effective in reducing risk of loss than changing roof, fencing, etc. to be non-combustible.⁹ New building standards require special fire-resistant building materials, sprinkling systems and water supply fixtures for fire fighting, as well as fire resistant vegetation controls. Five communities built according to these standards, straight in the swath of October 2007 fires, survived.¹⁰

The remainder of risk-reduction opportunity lies beyond the 50' area nearest a structure, or wherever the wildland boundary occurs. Studies on flammability of structures during wildland fires indicate that fuel management out to 100 feet from the structure will reduce flame length to levels that may be acceptable.^{11,12} In the City, the decision was made to manage plant material to 100' to reduce risk.

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San Diego's climate is a cycle of roughly six months of cool, rainy weather and six months of hot dry weather. The most risk from wildfire occurs toward the end of the dry season. At the same time, high winds typically come out of the eastern deserts. This high wind at the end of the dry season has been shown to inflame wildfires capable of burning

⁷ Vick, Karl and Geis, Sonya, "Let Some Fires Burn, Ecologists Argue," The Washington Post, October 28, 2007, http://www.star-telegram.com/national_news/story/284306.html

⁸ Boxall, Bettina and Julie Cart, "Houses Fueled Tahoe Blaze," Los Angeles Times, August 4, 2007

⁹ Wilson, A.A.G. 1984. Assessing the bushfire hazard of houses: a quantitative approach. Technical Paper No. 6, National Centre for Rural Fire Research, Melbourne, Australia.

¹⁰ Johnson, Kirk and McKinley, Jesse, "Rethinking Fire Policy in the Tinderbox Zone," The New York Times, October 28, 2007.

¹¹ Cohen, J.D., R.A. Chase, S.L. LeVan, H.C. Tran., A Model for Assessing Potential Structure Ignitions in the Wildland/Urban Interface. Proceedings of the 11th Conference on Fire and Forest Meteorology, April 1991. Missoula, MT. Patricia L. Andrews, Donald F. Potts, eds. Society of American Foresters, Bethesda, MD. pp. 50-57 (1991).

¹² Cohen, J.D. 2000. Preventing disaster: home ignitability in the Wildland-urban interface. *Journal of Forestry* 98(3):15-21.

through new or old growth of dry vegetation.^{13,14} Federal analysis of the Angora Blaze near Lake Tahoe, for example, concluded that “the fire burned just as intensely in those areas [thinned] as on forest acreage that had not been thinned.”¹⁵

San Diego Fire-Rescue Department has used the National Fire Protection Association (NFPA) 1144 Standard for Reducing Structure Ignition Hazards from Wildland Fire and the Wildland/Urban Interface Code-Danger Rating System as a basis for assigning risk values not related to building structure. Denser vegetation, more severe slopes, response times of five minutes or greater, difficult roads and lower proximity to fire hydrants increase the risk. Areas of the city that are far from roads and fire hydrants, are brush covered, and have a steep slope show as a high fire risk.¹⁶ Infrastructure (fire hydrants and roads) is a risk factor, as are “suppression resources,” meaning fire stations, firefighting equipment and firefighters.

Inadequate resource allocation was the former San Diego Fire Chief Jeff Bowman’s greatest objection to the City of San Diego’s post-Cedar Fire response, and the reason he resigned in frustration in 2006. Bowman wrote: “The most important component of an effective response system is adequate spacing of fire stations and staffing of equipment. The greater region, but particularly the city of San Diego, remains grossly understaffed for a metropolitan city. Before leaving as chief of the San Diego Fire Department, I recommended the need for over 20 additional staffed fire stations to meet minimum standards established for fire and medical response in urban environments. Since I left not one station has been added, and I am not aware of any plan to even work toward that goal incrementally.”¹⁷

Many large native shrubs — are evergreen during the dry season, which means they provide shelter for wildlife, and they are less flammable and more drought tolerant than many other species.

The True Character of Native Shrubland

San Diego is a semi-arid region of low precipitation. Its two-season climate is called “Mediterranean” because, like that region, half of each year is hot and dry. Native plants evolved with an ability to reduce water loss in this dry climate by many strategies.¹⁸ The most common native plant communities on San Diego’s canyon slopes are chaparral and coastal sage scrub. These ecosystems include species that are unique to our region, some of which have protected status through the federal and state governments. In this low-water climate, these large shrubs are the largest plants that can grow on the amount of

¹³ Moritz, M.A. “Spatiotemporal analysis of controls on shrubland fire regimes: Age dependency and fire hazard. *Ecology* 84(2), 351-361. 2003

¹⁴ Keeley, J. E., Fotheringham, C. J. & Moritz, M.A. “Lessons learned from the October 2003 wildfires in southern California.” *Journal of Forestry*, October/November, 26-31, 2004.

¹⁵ Boxall, Bettina and Julie Cart, “Houses Fueled Tahoe Blaze,” *Los Angeles Times*, August 4, 2007

¹⁶ Mayor Sanders’ brush management fact sheet: www.sandiego.gov/mayor_brush_factsheet_8_1.pdf

¹⁷ Former San Diego Fire Chief Jeff Bowman, Commentary, *San Diego Union Tribune*, October 28, 2007.

¹⁸ Halsey, Richard W. “Fire, Chaparral, and Survival in Southern California.” Sunbelt Publications; San Diego, 2005.

rainfall. About two dozen large shrub species – including toyon, lemonadeberry, California lilac, redberry, scrub oak, hollyleaf cherry, manzanita and sumac – are evergreen during the dry season, which means they provide shelter for wildlife, and they are less flammable and more drought tolerant than many other species. Several hundred other species of native plants go dormant by dropping leaves or shriveling to mere roots during the dry season.

Fire has also played a part in the evolution of these resilient native plant communities. Richard Halsey is an expert on the complex blend of plants known collectively as “chaparral.” He explains that chaparral communities survive fires, but depend for their survival on fires that occur in a tolerable frequency, intensity, and seasonality.¹⁹ He emphasizes that inaccurate reports overestimate the frequency of fires in healthy chaparral. Carl Bell, a professor from the University of California, Davis, concurs, stating that without human interference chaparral should burn once every 50 to 100 years.²⁰ They and other researchers state that the assertion that, “old stands with an ‘unnatural accumulation of old brush’ become more flammable,” is inaccurate.



Shrub-removal often damages soil, water and wildlife, and further, the fast-growing weedy fuel that replaces the shrubs extends fire vulnerability, resulting in higher, not lower, risk to life and property.

Studies by M. Moritz

and others have shown that after 15-20 years, fuel quantity stabilizes, so the age of the

“Why should animals lose their homes, and even their lives, because humans build flammable houses too close to nature?”

vegetation does not affect its combustibility.^{21,22} Other scientists have examined the same question through mathematical modeling and arrived at the same conclusion. Under Santa Ana winds, the largest fires occur, and fire rapidly sweeps through *all* chaparral stands, regardless of age.²³ The 2007 fires bore this out.

¹⁹ Halsey, Richard W. “Fire, Chaparral, and Survival in Southern California.” Sunbelt Publications; San Diego, 2005.

²⁰ Bell, Carl. “Invasive Plants and Wildfires” Guest Speaker. Oct. 14. 2006

²¹ Moritz, M.A., J.E. Keeley, E.A. Johnson, and A.A. Schaffner. 2004. Testing a basic assumption of shrubland fire management: Does the hazard of burning increase with the age of fuels? *Frontiers in Ecology and the Environment*. 2:67-72.

²² Halsey, Richard, “Fire & Science,” <http://www.californiachaparral.com/firescience.html>

²³ Zedler, P.H., Seiger, L.A. 2000. Age Mosaics and Fire Size in Chaparral: A Simulation Study. In 2nd Interface Between Ecology and Land Development in California. USGS Open-File Report 00-02, pp. 9-18.

Fuel Reduction Strategies from Other Ecosystems: Shrubs and Brush

As development increasingly encroaches on California wildlands, firefighters trained in coniferous forest-fire fighting are recruited as WUI wildfire fighters. State and Federal fire-fighting agencies assist county and city fire fighters, sharing policy, practice, and technique in efforts to try suppress wildfires and save structures and lives.

Hence, forest-fire fighter terminology and concepts, which have their origins in the timber industry, have been transferred to California shrub lands, including San Diego's. Forest-fire fighters call anything smaller than an overhead tree "brush." For a forester trying to grow lumber, "brush" appears to have no value. Dense, overgrown and aged shrubs can conceal fallen dead, flammable debris, which fuels large flames that will damage or kill mature trees. Recent ecological research is finding that healthy understory shrubs in fact play key parts in the health of forests by fixing nitrogen and absorbing rainfall, but in the eyes of many forest-fire fighters, "brush management" is the same as shrub removal is the same as pest-plant removal.



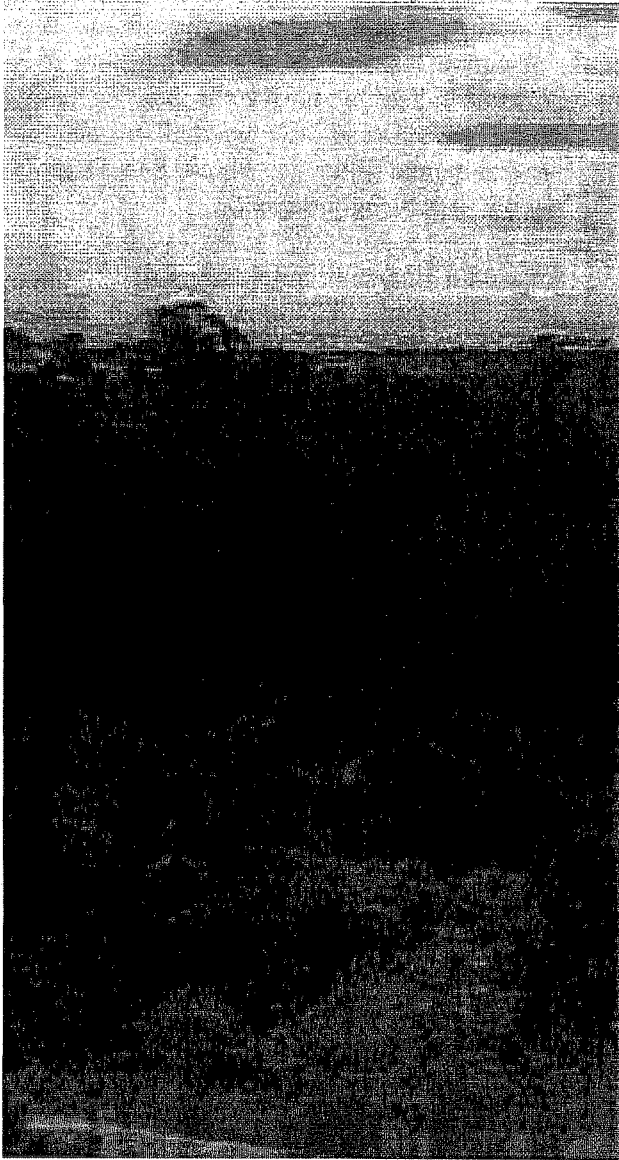
Post-fire native shrub landscape
resulting in higher, not lower, risk to life and property.

This bias against shrubs has greatly impacted fire-fuel management at the WUI in coastal Southern California, where wild shrub landscapes predominate. Unfortunately, the forest-fire fighters recruited to suppress fires at the WUI, and the politicians who respect their experience and fire-fighting knowledge, call these well-adapted shrub landscapes "brush." In this context, brush (shrub) removal often damages soil, water, and wildlife, and further, the fast-growing weedy fuel that replaces the shrubs extends fire vulnerability,

SHRUB and BRUSH are anagrams, not synonyms.

Additional Stakes: Ecosystem Services

Drought tolerant native plant communities are adapted to this region. These defining landscape features of our region thrive. They hold soil down and serve as the regional version of an “urban forest.” Vegetation in the city is very important to human health and the quality of urban life. The value of natural systems to humans is described as “ecosystem services,” and ecosystem services equate to money, as explained in the *Canyon Policy Portfolio* Preamble.



Dense green canyons generate life support for humans.

Well maintained native vegetation can supply the following ecosystem services:

- Prevent or reduce erosion and flooding
- Improve water quality
- Provide oxygen
- Reduce summer air temperatures
- Sequester carbon
- Increase community health by reducing noise and providing areas to walk
- Lower crime by increasing community involvement in open space
- Sustain wildlife which interacts with the plants as needed for seed dispersal, pollination, pest control, and other interdependent roles in the ecosystem
- Raise property values if all these conditions are in place

Some of these ecosystem services save taxpayers money directly/ Others reduce the cost to repair environmental damage. That is why city planners and urbanists now refer to urban vegetation as “green infrastructure.” It delivers

value to humans, just as roads, pipes, cable and wires deliver value. To remain healthy and continue delivering these ecosystem services, each native plant species needs:

- Root area sufficient to its size and free of invasive alien species
- Soil appropriate for its needs
- Sufficient water but not excessive water
- Appropriate seasonal sun exposure
- Low major plant nutrients
- Soil that is not disturbed nor compacted, so fungal networks are established

Although, as noted above, some experience in Los Angeles County has found that thinning is hazardous to coastal sage scrub, objective research is scant. Therefore it is unproven how much thinning and pruning will result in healthy, native shrub ecosystems.

These ecosystems are needed to do the environmental jobs on which San Diego's people increasingly depend.



Important financial conclusions tied to open space resources in the *San Diego Urban Ecosystem Analysis* and other ecosystem service research were not part of the City's brush management investigation.

The *Ecosystem Analysis* studied land-cover changes over a 17-year period, during which San Diego lost 32% of its grassland, 27% of its trees [which American Forests defined to

include shrubs over 6 feet] and 7% of its shrub land, as well as increasing its urban areas by 39%.²⁴ Those losses urbanized 30,977 acres of land that was formerly "wild." That urbanization, while not devoid of greenery, does amount to 81% *impervious* surface, in other words, land like this that has no environmental benefit and plenty of environmental draw-backs. Thus, of the 30,977 acres studied, 25,091 acres lost eco-system services, such as storm-water retention. Using calculations garnered from the *Analysis* and confirmed by

Shouldn't ecosystem service costs be considered before the mad rush to remove the very source of those services?

California Department of Forestry and Fire Protection, storm-water retention was worth, conservatively, \$1,701.81 an acre in 2002, when the *Analysis* was published. That meant that development between 1985 and 2002 created storm water retention costs to San



"Until we began using fuel to get around, we didn't have these headaches."

²⁴ *San Diego Urban Ecosystem Analysis*, American Forests, 2002

Diegans in excess of \$175 million that the City's Storm Water Pollution Prevention Program is just now trying to figure out how to pay for. Recognize that developers and purchasers of property did not pay for the storm-water problems that resulted from the development. We taxpayers are paying for it now.

More recent estimates by the City of San Diego's Storm Water Pollution Prevention Program figure storm water pollution prevention (which is different than mere retention) may cost as much as \$87,500 per acre.²⁵ That 2007 figure is considerably higher than the \$1,701.81-worth of retention of 2002. Vegetation losses from brush management clearly increase soil loss in storm water, which adds to pollution and downstream sedimentation, though that effect needs to be calculated to estimate its cost. This as well as the value of other ecosystem services – carbon sequestration, oxygen, air purification, etc. should be considered when we're talking about thinning the shrubby urban forest.

The Brush Management Guidelines

Despite the very high risk factor present in tens of thousands of existing flammable structures and *developed* landscapes, open space brush management has become the City's most strongly promoted frontline defense against structure loss at the WUI. To that end, the City developed the Guidelines for thinning.

Scientists know that interconnected and mutually inclusive facts are the only reliable basis for effective policy. However, the City's brush management regulations rely on minimal fact. The *only* objective research to date found 100' of space without fuel prevented wildland flame from striking a structure.²⁶

Decision makers kept this fact in isolation from other necessary facts: Trying to maintain bare earth is not a reasonable goal in any environment: something will grow on San Diego's soil, even with the low amounts of rainfall. Also, plants are needed to prevent erosion which can also damage property and contribute to storm-water pollution. Bare-earth (as in the "thinned" Tierrasanta parcel at right) has little ecosystem service value. Hence,



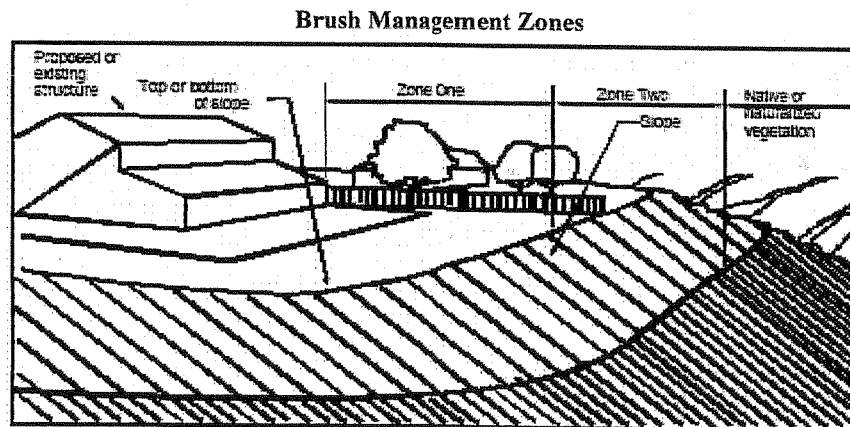
completely bare earth is not a desirable goal. Even so, decision makers adopted the assumption that bare earth was completely effective and achievable, then ran with it, even

²⁵ Figures from the City of San Diego Storm Water Pollution Prevention calculations, 2007

²⁶ Cohen, Jack D. 1999. *Reducing the Wildland Fire Threat to Homes: Where and How Much?* Proceedings of the symposium on fire economics, planning and policy: bottom lines. Gen. Tech. Rep. PSW-GTR-173. USDA Forest Service. 189-195.

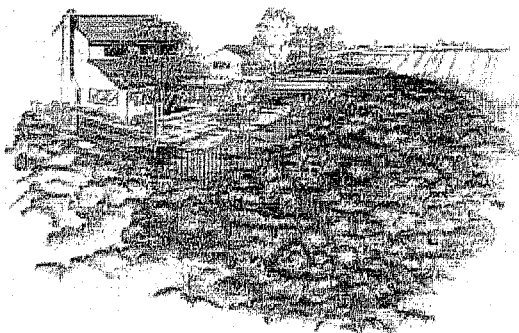
though it was an assumption, not a fact.

Using this assumption, the *Guidelines* illustrate a supposedly acceptable method for implementing the Brush Management Ordinance, Number O-19413. The hoped-for effect is to minimize flame length enough to prevent structural ignition. The smaller flames presumed to result from this pattern of fuel management would allow firefighters to stage fire suppression and defend the home or community, so the dual goals of this flame control are referred to as creating “defensible space.” The Ordinance extrapolated these assumptions to result in precise – though unproven – instructions, which have been diagrammed in the official *City Brush Management Bulletin* as follows:

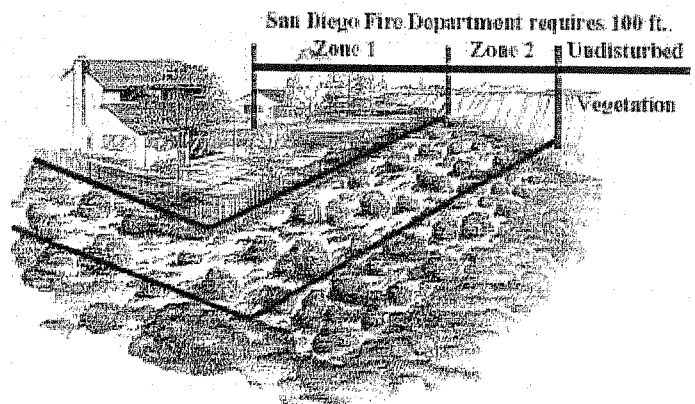


Brush Management Zone 1: (35 feet from the structure, on the flat part of the property next to a house).

- Must be irrigated or watered regularly
- Must consist mostly of ornamental vegetation like lawns, low-growing shrubs, some trees, with not more than 10% native or naturalized vegetation.
- Trees and large shrubs must be pruned away from structures and roofs.
- Irrigation from Zone 1 must not run onto Zone 2 because it encourages weed growth.



Before Brush Management



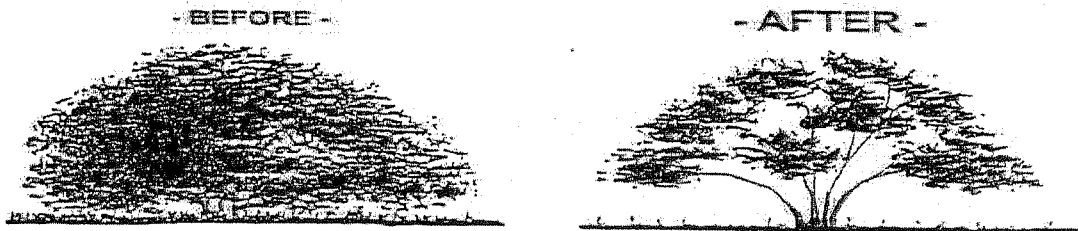
After Pruning and Thinning

Brush Management Zone 2 is the remaining 65 feet from a structure, whether public or owned privately, and is usually comprised of natural vegetation.

- Can have NO permanent irrigation.
- Must be regularly *thinned and pruned* to reduce vegetation by 50%, according to the steps below, without harming native plants, soil or habitats.
- Brush management is not allowed in coastal sage scrub during the California gnatcatcher nesting season, March 1 through August 15. This small bird only lives in coastal sage scrub and is listed as a threatened species by the federal government. Any harm to this bird could result in fines and penalties.

Step 1: Remove as much of the dead wood as possible.

Step 2: Prune tall vegetation like chaparral by cutting and shaping larger plants into “umbrellas.” This means pruning away the lower branches—which amounts to about half of the shrub -- of plants over 2 feet high to create umbrella-shaped canopies. This allows you to see and deal with what is growing underneath. Do not prune the tops of plants, just the lower branches. This keeps the plant healthy, and the shade from the plant canopy reduces weed and plant growth underneath. In vegetation that is less tall, like coastal sage scrub, you may not need to do Step 2. Prune non-native plants before native plants are pruned.



Step 3: Thinthe entire Zone 2 area. This means cutting down no more than 50% of the plants over 2 feet high to a height of 6 inches, and may include some of the plants you pruned in Step Two. Don't go any lower than 6 inches so the roots remain to control soil erosion. The goal is to create a “mosaic” or more natural look, as shown below, so do your cutting in a “staggered” pattern. Leave uncut plant groupings of 400 square feet—that's a 20 x 20-foot area, or an area that can be encircled by an 80-foot rope—separated by groupings of plants cut down to 6 inches.

Step 4: Dispose of the cuttings and dead wood by either hauling it to a landfill; or, by chipping/mulching it on-site and spreading it out in the Zone 2 area to a depth of not more than 6 inches.

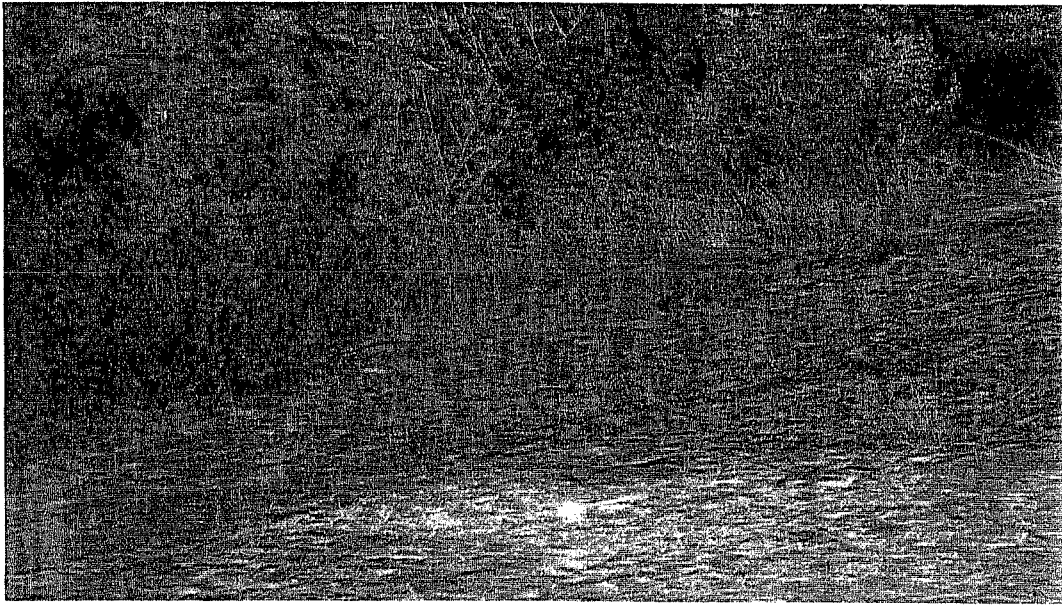
Step 5: Prune annually because plants will grow back. You can also “nip it in the bud” by rubbing out the buds on plants in the spring to keep from having to prune and thin as often.

Shortfalls in the Brush Management Guidelines

*Where is the wisdom we have lost in knowledge?
Where is the knowledge we have lost in information?*
- T. S. Eliot

These *Brush Management Guidelines* have gone through a number of revisions, yet all

involved with them agree that they still have language that is confusing and contradictory. Some lack of clarity remains, because there is little agreement that the recommendations are sound. No surprise there, since they are based on assumptions, not facts. The hope that these *Guidelines* will actually result in sustainable low-fuel loads at affordable perpetual costs remains unfulfilled.



Will mimicking the Guidelines create affordable, sustainable low-fuel conditions and therefore low fire risk, along with that negligible impact on natural resources? As the above photo of brush management in Tierrasanta demonstrates, *NO*. Both analysis and results make it clear that shortcomings in the *Brush Management Guidelines* work against the goals they were designed to achieve.

For a start, the protocol assumes that both zones will remain free of flammable debris and deadwood *perpetually*, even though no program or funding exists to achieve such a goal. It also calls for the removal of flammable wood structures. Enforcement of this requirement has not occurred to date.

One of the most damaging elements in the *Guidelines* as written is that, although they illustrate thinning and pruning that leave 50% of the soil covered with vegetation, the Ordinance requires 50% removal, words that have been interpreted to lead people to remove shrubs far in excess of the amount that is the basis for the City concluding that its brush management is environmentally neutral.

Though light irrigation in Zone 2 could provide evergreen shrubs the moisture needed to resist combustion, it is

Shortcomings in
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Management
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achieve.

disallowed. A planned, planted and maintained landscape that extends beyond 35' from a structure also clearly would justify use of irrigation.

The *Guidelines*' aspiration to make "negligible impact on natural resources" is unworkable, if one relies on observed brush management activities carried out in the past two years. The research of C. J. Fotheringham, a fire-ecology scientist at UCLA, suggests practices that might result in better fuel management, as below. The underscored suggestions are not in the City *Guidelines*.

Hand thinning by crews is potentially the least damaging to native shrublands, provided adequate training and supervision is provided. Crews can be trained to avoid and minimize impacts to desirable and special status species as well as to avoid removing fire resistant species. It is also one of the most expensive methods of fuel modification, at least initially. With hand crews, dead material in shrubs and flash fuels such as annual grasses can be removed while leaving green canopy intact that, in the absence of dead branches, will resist fires. Hand pruning of dead material while leaving as much of the canopy cover as is safe helps minimize colonization by alien species, which form flash fuels and act to increase the probability of ignition and the rate of fire spread. Chipping of removed woody materials and dispersing on the site in any openings created will inhibit aliens and also protect soils from erosion. Sites treated thoroughly do not typically need to be treated again for several growing seasons until sufficient quantities of dead material accumulate again, depending on site productivity.²⁷

A comparison of Fotheringham's suggestions to the City *Guidelines* is worthwhile. Workers using hand tools can observe which limbs are dead and which are alive (in evergreen species) and leave healthy wood. Workers do not trample the soil like wheeled mowers or dozers would. For instance, the City *Guidelines* do not recommend using only hand tools.

Nor do the *Guidelines*



Example of erosion and slope destabilization as a result of "thinning."

²⁷ Fotheringham, C. J., "Preliminary Observations of City of Laguna Beach Goat-mediated Fuel Modification Program and the Impacts to Aliso and Wood Canyons Wilderness Park and the NCCP Reserve," 2006.

recommend leaving "fire resistant species." As noted, many native shrubs are evergreen. Very few fire crews can identify species, and the City does not send a biologist along to inform them.

The City *Guidelines* do not recommend removing non-native vegetation and invasive vegetation first, a very significant oversight. Most invasive exotic annual and perennial weeds produce more fuel every year than native shrubs occupying similar area. Trimming summer drought-deciduous species and annual plants at the beginning of the dry season is also prudent, but unmentioned.



"Why should taxpayers support crews who are destroying complex plant communities, with complex soils, upon which all San Diegans depend?"

To continue the comparison to Fotheringham's list, the *Guidelines* do not require that vegetation be chipped and dispersed. Studies show that the crust of the soil of these plant communities is critical to its health, and that organic mulch must be distributed judiciously in order to avoid harming this crust. Clearly it would be unwise to chip and disperse any debris that included weedy invasive species seed. Still mulching with trimmed native plants contributes to soil replenishment and helps prevent erosion.

Most of the
invasive exotic
annual and
perennial weeds
produce more
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than native
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similar area.

Property boundary conditions challenge the *Guidelines*, too. In many older neighborhoods of San Diego, private lot lines may incorporate only 15 to 30' between a home and a dedicated park or open space. This means that 70' to 85' of the 100' fuel management must be done on public land. In other areas, private property extends to canyon bottoms, some with habitat for increasingly rare and endangered species of plants and animals. Many of these properties are within a countywide habitat conservation plan (the Multiple Species Conservation Program, or "MSCP") and are subject to federal and state regulation set up as a tradeoff with development.

Neither the City
nor the public has
no reliable way to
achieve the ideal
fuel management
conditions so
carefully
developed on
paper at this time.

However, the agencies charged with protecting these ecosystems signed off (in the 1997 Memorandum of Understanding or MOU) (See Appendix) to permit thinning and other fuel-reduction in these areas. Although the MOU characterizes the thinning and fuel reduction as inconsequential, no data yet exists for the impact of this amount of change to vegetation. Several conversations with fire inspectors revealed that they do not tell people whether the land they are being obliged to thin is within a conservation easement. As a consequence, people are removing valuable,

sensitive natural resources, believing that they are making their structures substantially safer. Sadly, this assumption of safety is false, without structural and existing landscape alterations, so the loss is even more poignant.

The City estimates about 220 linear miles of San Diego's WUI have large species of trees and shrubs with heavy litter, flammable garden structures and other combustible elements. However, other than occasionally requiring owners to remove flammable trash or dead weeds, the City fire marshal has no mandate to require changes to these areas unless native plants are growing there. (In other words, the mandate only affects the plants that are most well-adapted to our region and holding down the soil the best.) The City chose to not require homeowners to make changes to existing exotic landscapes that lack native vegetation even if those landscapes have a high capacity for combustion. Ironically, homeowners who have planted native species in their gardens have had the fire marshal make them remove their plants, even though the plants were irrigated and pruned. The limitation in the *Guidelines* to no more than 10% native species is arbitrary and without reason. This is not serving the community need for reducing risk.



Native species removed. Non-natives remain.

Whatever the worth of the City's brush management methodology, it is grossly undermined in other ways. The City mandated neither training nor crew certification to assure implementation according to the *Guidelines*. A training video was developed in 2004-05 to teach the City's brush management methodology. It was never finalized for public distribution. In addition, the City was at one time

considering creating a training class where certification to brush manage could be given to landscapers. The program was dropped because of lack of funding and staff time.²⁸ Some suggest that the question of the City's liability for acts by fuel-management services caused the program to be discontinued.

In short, neither the City nor the public has no reliable way to achieve the ideal fuel management conditions so carefully developed on paper at this time. Most crews are ignorant of the *Guidelines*. Poor brush management that does not conform to *Guidelines* is penalized only if someone reports it to the Neighborhood Code Compliance Department (assuming that they can figure out how to do this), and then the penalties are only levied in the most radical, over-thinned cases. In short, there is no way to assure the goals of the Ordinance can be achieved.

Unless a structure has been improved to reduce combustibility, the improvements in the

²⁸ Kimberly Ann Davies, Deputy City Attorney, email 8/27/07

landscape are no guarantee of safety. Both must be done well, or a structure is still at risk. Again, the City chose not to require changes to existing structures and gardens that could greatly reduce risk to those properties and the communities near them.



Green, incised canyons define San Diego watersheds. They constitute upstream wetlands that can contribute positively to the health of our ocean and bays.

An Expensive Upshot: Flammable Invasives

At the time of hearings on the Ordinance, many questioned the assumption that these *Guidelines* could succeed in reduced fire risk. Qualified experts testified that if a canopy of shrubs is opened up, and the soil is damaged by foot or machine traffic, it is likely that fast-growing, highly flammable annual weedy plants will germinate and grow the next season, as the City's own evaluation concluded.

Exotic annual and perennial weeds dry out months before many native shrubs reach a level of dryness that might make them easily ignitable. Many exotic species (mustard, radish, hemlock, fennel, oats, thistles, and grasses) can grow five to ten feet in one year. Research shows that chaparral shrubs take more heat to ignite than equally water-stressed introduced grasses and weeds. Most invasive species are annual or herbaceous: masses of dead fuel are produced each year. In short, they are more flammable than the native species they replace. Carpets of dry fuel carry fire rapidly across the landscape.²⁹ Hence, fire-fighters call these dry weeds "flashy fuels." Regional climate change and careless land use are allowing arid plant communities to be overwhelmed by grasses, in particular. Grasses dry very early in the non-rainy season, resulting in several months' longer fire season.^{30,31}

MORE GROWTH / MORE FIRE FUEL

In Tecolote Canyon, in 2006-07 (a year with only 3" of rain), exotic weeds produced stems 3-4' high. These exotic weeds produced 3 to 4 times more flammable growth than native shrubs in the same area in that season, according to observations by Kay Stewart, a landscape architect and biologist who helps with nature education programs. The City expended public funds mow these weeds.



The City is presently out of compliance with its legal commitment to eradicate invasive exotic species within its conservation lands (Multiple Species Conservation Program

²⁹ Bell, Carl. "Invasive Plants and Wildfires" Guest Speaker. Oct. 14. 2006

³⁰ Halsey, Richard W. "Fire, Chaparral, and Survival in Southern California." Sunbelt Publications; San Diego, 2005.

³¹ D'Antonio, C. M. & Vitousek, P.M. "Biological invasions by exotic grasses, the grass/fire cycle and global change." *Annual Review of Ecology and Systematics* 23, 63-87. 1992.

holdings). This topic is covered in more detail in other sections of the *Canyon Policy Portfolio*. For purposes of this discussion, it is enough to note that existing brush management protocols will result in more very flammable invasive exotic species, for which no source of eradication funding exists. In addition to causing wildfires of increased frequency, intensity, and size, invasive non-native plants...

- ...Alter soil chemistry, microbiological character, and nutrient levels
- ...Lower water tables
- ...Alter rates of sedimentation and erosion, as well as susceptibility to flooding
- ...Displace or out-compete native plant species
- ...Degrade or eliminate habitat for native animals and organisms
- ...Providing habitat for undesirable non-native animals and organisms.³²

Existing brush management protocols will result in more very flammable invasive exotic species, for which no source of eradication funding exists.

Response to the Brush Management Code Revisions

Doubt comes in at the window when inquiry is denied at the door.
- Benjamin Jowett

An Environmental Impact Report for the Brush Management Revisions to the Land Development Code was circulated in 2005, as required by the California Environmental Quality Act (CEQA). In response, the environmental regulatory agencies, the environmental community, the City of San Diego's own Community Forest Advisory Board, the San Diego Fire Recovery Network, and others expressed serious reservations about the proposed revisions. Many comments to the proposed revisions were submitted by scientists and environmentalists familiar with San Diego's native ecosystems. These letters disagreed with the report's assertions...

- a) that conservation of threatened and/or endangered species covered under the Multiple Species Conservation Plan (MSCP) would be maintained,
- b) that uncovered species would not be deleteriously affected,
- c) that there would not be a net loss in habitat,
- d) that mitigation should not be required,
- e) that erosion will not be significant,
- f) that the analysis of the "increasing building regulations" alternative to brush management was sufficient for CEQA compliance,
- g) that prior brush management regulations combined with code revisions, requiring "fire proof" buildings will not accomplish desired goals,
- h) that fire impacts will be reduced.

³² University of California Cooperative Extension: <http://cesandiego.ucdavis.edu/Custom%5FProgram/>

Even though the formal steps described in the Brush Management Guide specify no harm to native plants, soil or habitats, the specifications themselves, the failure to demand training and certification of competent crews, the absence of implementation review and follow-up, the lack of penalizing except for reported and radical violations, and the lack of administrative staff and guardianship all *guarantee* harm.



In San Diego native ecosystems, one plant needs another plant needs another plant needs undisturbed soil, full of sensitive hard-working microorganisms that suffer from disturbance.

The impacts of brush management to biological resources will be highly significant. Reducing shrub density and removing dead wood does reduce the fuel load, but they also have a negative biological effect on plants and dependent species. Changes required by the brush management *Guidelines* reduce the health of the overall habitat. Shrub density and decay are an intricate part of the ecosystem; they contribute to biodegradation and soil health that involve hundreds if not thousands of organisms. The habitats function in communities, and with the elimination of density and biodiversity, the communities will falter. Numerous published scientific papers support this conclusion.^{33,34,35}

³³ Longcore, Travis, "Ecological Effect of Fuel Modification on Arthropods and Other Wildlife in an Urbanizing Wildland," The Urban Wildlands Group, 2003.

³⁴ Bell, Carl. "Invasive Plants and Wildfires" Guest Speaker. Oct. 14. 2006

³⁵ Fotheringham, C. J., "Preliminary Observations of City of Laguna Beach Goat-mediated Fuel

Soil compaction that occurs as brush management is being achieved reduces infiltration and the delivery of water to roots and groundwater. This works against the city's important water-conservation objectives. Another consequence of brush management: soil disturbance and clearing will contribute to erosion and possibly flooding.

As fire laboratory research proves, expanded brush management works in vain toward the 20% risk reduction, because structural changes haven't been implemented, and because thinning and pruning aren't scheduled and financed in perpetuity. Expanded brush management may provide some limited additional fire safety benefit. But this already minimal benefit may be lost when highly flammable, weedy, exotic species that invade "managed" areas, and weed control requirements are not enforced.

With the elimination of density and biodiversity, the plant communities will falter.

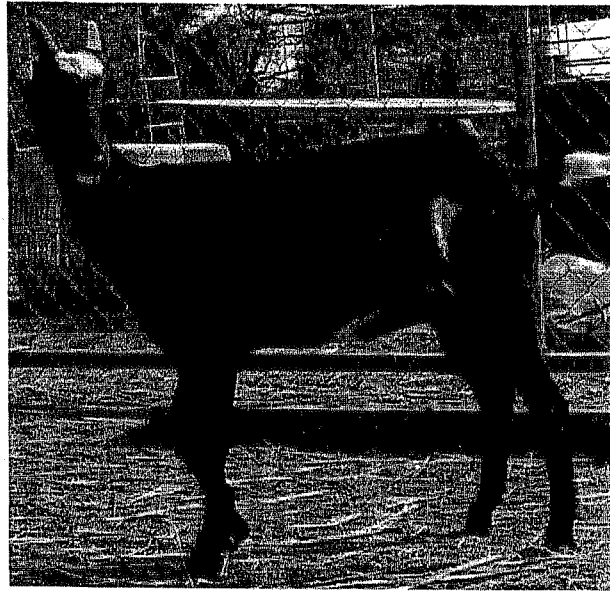
The best available data indicate that any brush management benefit is likely so small that it cannot outweigh the harm of unmitigated, significant impacts to biological resources and the introduced likelihood of erosion, sedimentation, and flooding, as well as the loss of ecosystem services such as energy conservation, water and air pollution reduction, carbon sequestration and others.



"I tremble to think what will happen when humans finally have the entire city under concrete."

Goats and Fire Risk Reduction

As part of its objective to accomplish revised brush management, the City also changed regulations to accommodate the use of goats for purposes of brush thinning.³⁶ Section 44.0307 of the San Diego Municipal Code now allows goats as a means of brush management on public and private land. Because goats cost less than human workers and might remove flammable vegetation from areas that are covered with exotic weedy annuals and grasses, the thinking was herds could contribute to maintenance. Grazing goats *seemed* to be cost effective. However, this accounting only included immediate expense, not long-term consequences.



Emily the Goat. A discriminating brush-thinning expert?

The City expended the initial cost to fund this program and change the Land Development Code, but relied on reports of the use of goats in other ecosystems, not San Diego ecosystems, to support the approach. Again taxpayers paid for assumptions unsupported by facts. The goats were cute, they generated media, and promoting goats as an official method of brush management seemed to supply the sense of security the public needed. According to Open space Division staff, the City has no data on how much they spent including goats' use in the Land Development Code and promoting them to the public.

The City now is trying to use goats to thin existing native-shrub landscapes, not just to reduce fuel in areas with exotic annual or perennial weeds. Experience teaches that it is hard enough to teach humans to do this work; it is impossible to use goats to leave a well-cared-for living shrub landscape with reduced fuel. Remember, the goal of the *Brush Management Guidelines* is to leave healthy, low-fuel (and low-fuel generating) plants that reduce flames.^{37,38} Goats will not eat dead wood, rather, they eat only live leaves and fine green twigs. Having goats browse in shrub lands destroys healthy

Goats will not eat dead wood, rather, they eat only live leaves and fine green twigs.

³⁶ Bull, Brian. "Using Goats for Vegetation Management" The Samuel Roberts Noble Foundation, Inc. 2006. <http://www.noble.org/Ag/Livestock/GoatVegetation/>

³⁷ Steele, Jeanette. "Fire Control Tactic Gets Critics' Goat." *San Diego Union Tribune*. September 9, 2006

³⁸ ³¹ Fotheringham, C. J., "Preliminary Observations of City of Laguna Beach Goat-mediated Fuel Modification Program and the Impacts to Aliso and Wood Canyons Wilderness Park and the NCCP Reserve," 2006.

living wood and leaves the deadwood, achieving the very opposite the goal of fuel reduction. Goats eat native and non-native species. If heavily browsed, scarce and valuable species die. Since goats eliminate as they eat, seeds that are in their feces remain. Weeds are thus distributed wherever goats graze, spreading the impact of invasive species to relatively pristine areas, allowing flashy-fuel invasive weeds to take over. Goats disturb the soil leaving it vulnerable to erosion. The sites that have been goat-grazed suffered huge setbacks. Goats also carry and can transmit diseases to humans, domestic pets and wildlife.³⁹

In summary, goat management precipitates problems including potential type conversion, slope degradation, and soil contamination. In the long term, the ecological impact of goats could be more financially costly because they often cause more damage than the benefits they create. During hearings on the proposed use of goats, the City gave no credence to comments regarding the potential for the goat methodology to negatively impact the environment. They should have. Goat shrub-management projects in Scripps Ranch do not look anything like the *Brush Management Guidelines*.

The ecological impact of using goats could be very financially costly because they often cause more damage than benefits.

This is another clear example of the City applying seemingly cheap methods to management without stopping to test the effects of those methods scientifically, and without taking into account the monetary cost to future generations.

Brush Management Today



What are the impacts of this program to the canyons? A survey of San Diego's urban canyons, measured from structures on one side to structures on the other side, shows that many canyons range from 500 to 1,000 feet across. This means that fuel management within a 100' area below each structure, as mandated, affects roughly 20-40% of the canyon vegetation.

According to federal and state analysis in the 2004 Brush Management Environmental Impact Report, by expanding the cumulative management area to 100 feet away from structures, the Brush Management revisions raise the total brush-managed target to 6,633 acres in the city, a great portion of that in

canyons. Moreover, again according to the Environmental Impact Report, over 16,000 acres of the City's 20,000 acres of open space present "a moderate to severe fire threat to communities," not including the thousands of privately owned interface properties.⁴⁰

Obviously, the current goal of managing brush on all these acres - City open space land or private land as required by the City, canyons or flatlands - would significantly alter the look of San Diego's shrub lands, and would critically reduce environmental benefits as measured by non-human habitat and ecosystem services.

Then, (horror of all horrors), since the City has inadequate funding, it asks uninformed property owners to do their best to create a defensible space around their properties. A fire inspector, not a botanist or certified arborist, gives a Weed Abatement Order and instructions. (Inspectors stated that the Brush Management Guidelines are written, not for all properties, but quality-habitat land.) If the land is within the conservation easement and/or "environmentally sensitive land," the property owners must get a permit. It is up to property owners to determine whether the property requires a permit or not. One wonders how motivated they would have to be to figure this out.

There are only two fire-inspector staff-persons now, whereas in the 1980s there were eleven.⁴¹ Fire inspectors do not have the staff to maintain a list of competent brush management contractors, as they did in the 1980s. Therefore, they refer homeowners to the Yellow Pages for private brush-management outfits. Since there is no crew training and certification process, private brush management crews are not obligated to follow the *Brush Management Guidelines*. With little

Massive shrub removal. This deviates from the terms and conditions of the City's 1997 Memorandum of Understanding with resource agencies.



Any environmental attorney worth his/her salt could find occasion to litigate about the City's brush management practices, even standing on one leg.

direction from the City of San Diego, people follow through by massive shrub removal. This deviates from the terms and conditions of the City's 1997 Memorandum of Understanding with resource agencies. In addition to habitat destruction and loss of protected species, such action deprives all San Diego of ever-more-critical ecosystem services (fresh water, air, etc.).

The permits are not enforced, usually, unless poor implementation of the Guidelines is reported to Neighborhood Code Compliance. Poor implementation is "clearing," according to a fire inspector. Nevertheless, the "more-you-remove, the less-fuel-there-is-for-fires" belief predominates, she said, motivated in part by the fact that many insurance

⁴⁰ "Brush Management Revisions to the Land Development Code," Environmental Impact Report, 2004.

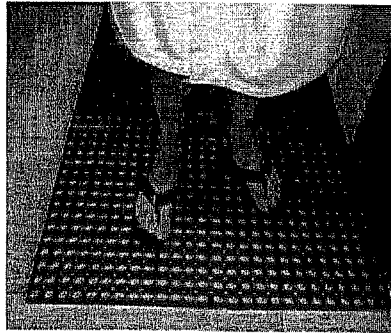
⁴¹ City Fire Inspector Barbara Favors

companies demand anywhere from 300 to 1000 feet clearing before they will insure houses.⁴²

It does not appear that the City has carefully looked beyond the immediate fuel-reduction goals to what will happen after the thinning occurs. Thinning reduces a fire's intensity but only until additional vegetation grows. Once the thinning process begins, jurisdictions should be prepared to follow-up with regular weed control.⁴³ But presently they are neither ready, nor funded to do so.

How Much Did It Cost to Change the Brush Management Regulations?

All involved in the brush management revisions agree that the process was cumbersome, long and involved. Words like "ordeal" are common, with phrases like "I don't know how anyone can make sense of the instructions" were repeated frequently. Long and arduous as revising the brush management regulations was, the City was unable to provide financial information on the cost (including the costs of EIR preparation, circulation, responses to comments, and staff time). Three managers from three separate departments (Development Services, Fire and Planning) steered the project and all three have left the City. Present managers from those three departments have more recently tried to figure out done; it quickly history is sketchy. Since regulations project was effort and a City project, system to track the hours Order Number), the charged to a general not specifically track the the project.⁴⁴



A mad-as-hell taxpayer who isn't going to take it any more.

Hence, there are no reliable numbers on how much it cost taxpayers to create regulations that will, in future years, cost taxpayers on-going millions to implement (likely an increasing amount, given the increasing amount of flammable non-natives that will occur) and on-going millions in lost ecosystem services.

⁴² City Fire Inspector Barbara Favors

⁴³ Carl E. Bell, Regional Advisor/Invasive Plants, University of California Cooperative Extension, County of San Diego

⁴⁴ City of San Diego emails, from Development Services Dept. and Planning Dept., July, 2007.

Brush Management Costs, Then and Now

In addition to their other problematic features, the Municipal Code revisions are very challenging to enact and enforce due to the cost of such work. In the past, the City set high targets for brush management, but budgetary constraints have prevented them from being realized. According to a Manager's Report issued January 21, 2004 by the City of San Diego, approximately 1,750 acres of Zone 2 areas along the WUI are managed by the City of San Diego Park and Recreation Department Open Space Division.⁴⁵

For the past 15 years, the City budgeted only enough money to thin approximately 70 acres of public-owned open space each year. The brush management staff consisted of one Utility Supervisor, two laborers, and a portion of a District manager, with an annual cost of \$336,097. (That's \$4,801 per acre.) Since the area they are responsible for is so large, there has only been selective enforcement. Staff responds to cases only when referred by the Fire Department, route slips, specific adjacent property owner complaints, or for a limited number of identified identified 1,180 acres of open space once every two years.⁴⁷ Ironically, still have the volume of stands of and open spaces.



In the Fiscal Year 2008 budget, the brush management program will allocation, which will allow the City "fuel" on 210 acres. This work started in October 2007. This goal, however, falls short of the 590 acres within Open Space Division jurisdiction which the City has set as a target goal to be thinned each year. The Fiscal Year 2008 budget for brush management on 210 acres is \$1,036,412, approximately \$4,935 per acre, according Mayor Jerry Sanders' fact sheet. This includes not just the labor, but also administration costs.

high priority areas.⁴⁶ Yet, staff has as requiring brush management limited funding is one reason we natural plants in the City's canyons

Park and Recreation Department's receive three times the previous to hire contractors to "manage

More funding may be available to increase the amount of land to be managed for fuel in shrub lands. In 2005, the City applied for a multi-million dollar brush management grant from the Federal Emergency Management Agency (FEMA) to subsidize thinning in 1,180 acres. News about that grant is due by year's end 2007. If the City receives the grant funding, it will be in a good position to expand the program to achieve its stated brush management target goal of 590 acres in Fiscal Year 2009. And if the City does not get the grant, staff intends to continue to look at cost-efficient ways to try to expand the program over time.

The costs of the City's plans to reduce fire risk at the WUI add up. Using the current goal, to "manage brush" on 590 acres every year, an estimate of the cost to achieve this (based on 2007 costs) shows:

⁴⁵ Loveland, George. "The City of San Diego Manager's Report." Jan. 21, 2004

⁴⁶ Loveland, George. "The City of San Diego Manager's Report." Jan. 21, 2004.

⁴⁷ http://www.sandiego.gov/mayor/pdf/brush_factsheet_8_1.pdf

\$4,935 per acre X 590 acres yearly = \$2,911,650

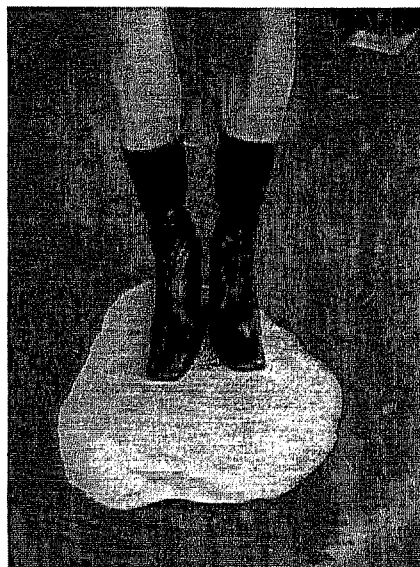
Note this is the cost will be used to suppress the risk of fire on 590/6,633 or roughly only 9% of the public land in the WUI that has been identified for fuel management. The remaining 91% would be treated over the next ten years, with the same (or more likely inflated) costs every year.

On private land, fees for fire inspection and notification add more to the per-acre public and private cost to implement the 100' fuel management program. Add the costs of fire inspection, Neighborhood Code Compliance, referrals, and permitting, and more to comply with *Brush Management Guidelines*⁴⁸ pushes private land management well over \$5,000 per acre, part public, part private costs.

Plus add to these annual costs, the expense that land subjected to the brush management program will require for removing weeds and additional growth. This investment will be needed long before all 100% of acres have been cut for the first time. This cost, with fast-growing weeds, can cost thousands of dollars per acre every year; or with slower-growing shrubs, it might be thousands every four or five years. These costs need to be added whether paid by public or private sources.

If these costs were all that are needed to reduce fire risk dramatically, it could be a good investment. Without the assurance that the *Guidelines* are in fact reducing vegetative fuels sustainably, and without also assuming the additional investment in the immediate landscape and the home structure, the investment in "brush management" is only one part of the risk equation. Is it the best use of public and private funds?

Still more costs must be included in this estimate: since evidence to date shows implementation of the Ordinance will degrade habitat, will compact the soil, will disturb the soil crust, and will degrade the nutrient cycling and absorption of pollutants. And as with the cost of work itself, evidence shows that brush management on private land is often more degrading than work completed by City contractors, so its costs are even higher.



"Making houses flameproof, like this rock, will keep them from burning, NOT destroying our 'green infrastructure.'"

The *Canyon Policy Portfolio*'s investigation of ecosystem services (See Section One) suggests that each acre of healthy chaparral delivers an average of \$206,964 in cleaner water, cleaner air, etc. Thinning by 50% will reduce 50% of the "biomass" upon which many ecosystem services depend, and it will destabilize soils, reduce infiltration, and

⁴⁸ Loveland, George. "The City of San Diego Manager's Report." Jan. 21, 2004.

increase erosion, a water-quality factor. Right away, it removes \$103,482-worth of ecosystem services value from each acre “managed.”

Brush managing City property and private property totaling 6,633 acres annually produces potentially \$174,116,250 storm-water pollution expenses.

Let’s examine the storm water pollution impact alone. It is safe to say that there is an impact, based on analyses of the storm water runoff in burned chaparral.⁴⁹ Again, we estimate very conservatively a 30% reduction in storm-water pollution prevention for every acre of brush management.

Using the City’s present per-acre cost of storm-water pollution clean-up and multiplying it times one-third: $\$87,500 \times .3 = \$26,250$ per-acre cost to storm water for brush management. Whoa! That’s an additional cost to storm water of \$15,487,500 for every 590 acres thinned. And that’s only on City-owned land. Brush managing City property and private property (which the City’s brush management protocols force), totaling 6,633 acres annually, produces storm-water pollution expenses of \$174,116,250 (6,633 acres x \$26,250).

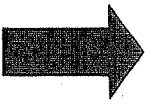
There seems little foresight and accountability for policies implemented with taxpayer money, not as measured by the latest and most prudent sustainability protocols. The Brush Management Ordinance was costly to create and pass (though the City of San Diego has no total on how much the mad dash to revise brush management cost), will be costly and difficult to implement in perpetuity, and almost impossible to enforce. It creates escalating costs for other City departments, such as Storm Water Pollution Prevention, Open Space Division, Planning, the Fire Department and potentially the City Attorney’s office. It purports to make it easier to protect private property, but at the cost of radically degrading public and private property.



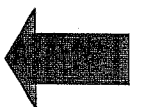
“Instead of Canyonlands Park, we’ll have a network of dry, weed and foxtail-infested blight. Sounds like a good place to dump old tires and mattresses to me.”

A footnote to the many uncalculated costs of the Brush Management Guidelines is that none of the planning, execution and promotion of the City’s Brush Management connects the dots – the ever-more pronounced dots – between the need for greater green infrastructure to mitigate the man-made contribution to global warming. This green natural vegetation is the very infrastructure that brush management destroys. This cost too should be computed, as carbon sequestration is now being computed for industrial carbon trading and balance sheets in the effort to reduce our carbon footprint.

⁴⁹ Effect of Chaparral Burning on Soil Erosion and on Soil-Moisture Relations, Arthur W. Sampson, Ecology, Vol. 25, No. 2 (Apr., 1944), pp. 171-191



One cannot help but wonder how much research, public education, strengthening of the building code, increased fire suppression resources, better infrastructure, and establishing new maintenance-funding streams could have been accomplished for the amount of money the City has expended and will continue to spend as a result of brush management.



Conclusion and Recommendations

We live in dangerous times, and *yes, fire is one of those dangers, an environmental danger*. Residents and businesses in our city are facing many interrelated environmental perils – contaminated oceans that limit food supplies and endanger human health, accelerating global warming brought about by burning fossil fuel and deforestation, air pollution, water pollution, drought and limited water – all tied to the health of our canyons. These perils are evidence that our human ecosystems, unlike San Diego's pre-human ecosystems, are entirely out of balance, unsustainable.

All perils have associated costs, to the government, to our health and safety, and to our individual pocketbooks. Therefore, the only conscientious directive is to weigh any proposed actions intended to reduce wildfire risks carefully, as they relate to:

- 1) *immediate challenges*,
- 2) *ancillary challenges*, and
- 3) *future impacts*.

Of these three, only "1" was considered in the process of revising Brush Management sections of the Municipal Code, and "1" is still the only consideration, as the City gears up to finance and demand brush management on more acres, always with the stated goal of *creating affordable, sustainable low-fuel conditions and therefore low fire risk, along with a negligible impact on natural resources*.

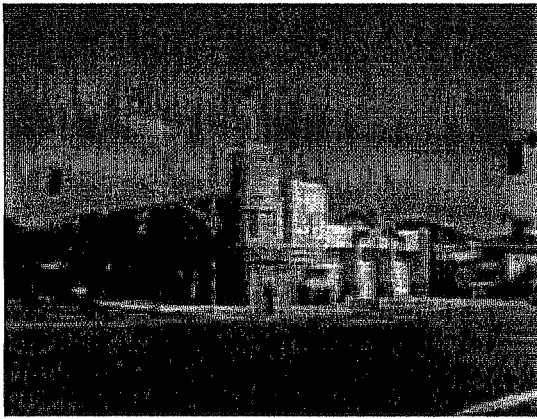
As presently undertaken, brush management actually *creates more fuel* because it too often occurs without training, without certification, without review, and with no demand that privately hired brush management crews follow the *Guidelines* (which are in any case flawed).

Clearly, the present Brush Management Ordinance and *Guidelines* do not assure these goals. As presently undertaken, brush management actually *creates more fuel* because it too often occurs without training, without certification, without review, and with no demand that privately hired brush management crews follow the *Guidelines* (which are in any case flawed). The result of addressing the *immediate challenges* is lower fire intensity (for a brief period) but no reduced ignitability in the structures. Or as "The Wildfire Preparedness and Recovery in San Diego County" white paper, issued in Spring 2007 by the University of California Cooperative Extension, states, although extensive

wildland vegetation management may serve a purpose, it will not effectively change the level of ignitability of a structure.⁵⁰

In its present form, brush management may reduce flame length the first year of implementation. However, it will introduce more acres of flashy fuels, which are more ignitable than the coastal sage scrub and chaparral they displace. The flashy fuels need to be removed annually, much more frequently and at more cost, than native-shrub dieback. Certainly such brush management does not have a “negligible impact on natural resources.” The impact is extreme.

Brush management is by no means a comprehensive approach to fire-fuel reduction. Many studies indicate that, at best, brush management by itself will not work to reduce risk by more than 20%. The structure itself must have comprehensive fire-safe features, and the City must invest in many more staffed fire stations, together with fire-support infrastructure.



For the City government, the *ancillary challenges* are those addressed by other departments. The Storm Water Pollution Prevention Program, Streets Division, the Water and Waste Water Department are grappling with water quality and erosion in canyons. The grossly underfunded Multiple Species Conservation Program is here to protect rare and endangered species, working toward goals that brush management practices subvert. All these practices land in the lap of Park &

Recreation Department's Open Space Division, which though largely responsible for our City's green infrastructure, is also chronically underfunded. (This year's additional funding of the Open Space Division is going, not toward protecting our precious canyon watersheds, but to reducing native plant cover by 50% in the brush management zone.) One-hundred-foot thinning on what is often two or more sides of canyons greatly alters and reduces extant vegetation, sometimes removing as much as a third or more of any given canyons' environmental benefits, as well as introducing often deleterious additional impacts.

What of *future impacts*? This paper asserts that the present Brush Management Guidelines – while briefly achieving “defensible space” – do not necessarily provide enough benefit to offset the potentially costly problems they engender. Before designing and implementing any more brush management, the protocol must be improved, monitored, documented, and understood. Analysis of the costs of failing to preserve chaparral and coastal sage scrub function and benefits are needed. Those benefits go

⁵⁰ “The Wildfire preparedness and Recovery in San Diego County” white paper issued in Spring 2007 by UC Cooperative Extension.

beyond the preservation of biodiversity and extend into slope stabilization, flood control, erosion control and ecosystem services -- benefits that are very, very expensive to achieve by other than natural methods.

The only way to gauge the success of the City's Brush Management Ordinance and *Guidelines* is to study and measure their effectiveness by comparison to other approaches. Are they reducing risk? How much? At what cost? Supplementary and/or other methods might provide more clear-headed understanding of fire safety, better fuel-reduction, and a healthier wildland-urban interface, ultimately at far less expense to taxpayers.

R E C O M M E N D A T I O N S

1. Before proceeding with any additional brush management, create a long-term accounting of brush management objectives that includes the diminished ecosystem services that will result and the financial impact of that reduction on taxpayers and the environment. Then, still before proceeding with any additional brush management, do a careful cost-benefit analysis to decide if brush management is necessary, and if so, in what form.
2. Establish at least twenty additional, better-equipped and staffed fire stations to meet minimum standards established for fire and medical response in urban environments. Add fire hydrants and other firefighting infrastructure.
3. Mandate, through code revisions and enforcement, retrofitting of existing homes on canyons' edge, to require fire-resistant building materials. Develop grants or other public funding to assist cash-strapped owners to be able to retrofit fire resistant structural improvements at the WUI.
4. Implement fire-safety training and education so residents are vigilant in reducing risks.
5. Announce and promote the benefits (ecosystem services) of densely vegetated canyons.
6. Create a brush management implementation strategy, which assures that skilled, trained crews will do the work required correctly and thus reduce risks.
7. Revise *Brush Management Guidelines* to:
 - a) Limit brush management to areas that have more than 50% cover.
 - b) Use hand tools to remove deadwood.

- c) Remove non-natives first
 - d) Do not prune evergreen and fire resistant species, except to remove dead wood
 - e) Disallow brush management that results in less than 50% cover, and
 - f) Chip removed woody materials and disperse on the site (except when they include non-natives), to inhibit weed invasions and protect soils from erosion.
8. On public land and on private land that is within the MSCP, require a Brush Management Permit that requires conformance to *revised Brush Management Guidelines*.
 9. Inspect and fine those who illegally undertake brush management.
 10. Allow brush management only in areas where subsequent weeding will prevent invasives incursions. In other words, identify funding sources for continued brush management in conservation easements or disallow that brush management.
 11. Conscientiously eradicate flammable “flashy-fuel” invasive plants instead of removing annually by mowing, weed-whacking or goat-grazing.
 12. Create a brush management certification program that trains prospective contractors to use the *revised Brush Management Guidelines*.
 13. Disallow brush management by contractors other than those certified.
 14. Enforce the removal of flammable garden structures and fences in Zones 1 and 2. Fine those not in compliance.
 15. Train fire marshals to diagnose and require fuel modification in existing at-risk home landscapes.
 16. Supporting research on the relationship of infrequent irrigation to flammability of plants at the WUI in our water-short region.
 17. Disallow the use of goats for brush management.
 18. Continue assiduous arson control.

For San Diego to achieve an equilibrium – given our climate, our water supply and our need for watershed stewardship upon which human health, safety and even survival depends – the short- and long-term effects of brush management must be rigorously analyzed, relative to fire-fuel risk reduction *and* ecosystem services.

Earth is in rebellion. Nature, as we have always known it, is fading, evanescent before our eyes and under our touch. If ever there were a time when we should be reinforcing our at-oneness with all that is wild, it is now. We must retrieve those vestiges that tie us to the land, the water, other species and the sky. We must gather them to us, nurture all that they are, that they might not die and our children's children's children with them.



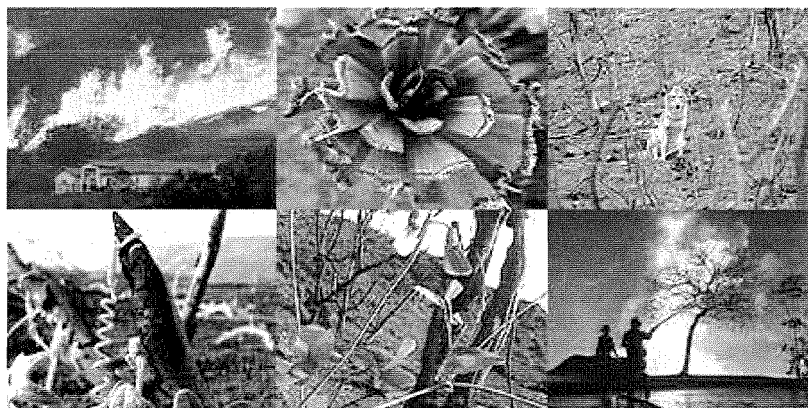
Being one with nature keeps us on our toes.

EXHIBIT 3

EARTH, WIND & WILDFIRE

learning to live with fire

Winner of Western Museums Association Exhibition Excellence Award!



This exhibition closed April 1, 2007

[Exhibit Overview](#) | [Our Place on Earth](#) | [The Power of Wildfire](#) | [Living with Fire](#)
[Resources](#) | [Related Programs](#) | [Teacher's Guide \(PDF format*\)](#) - [English](#) - [Spanish](#)

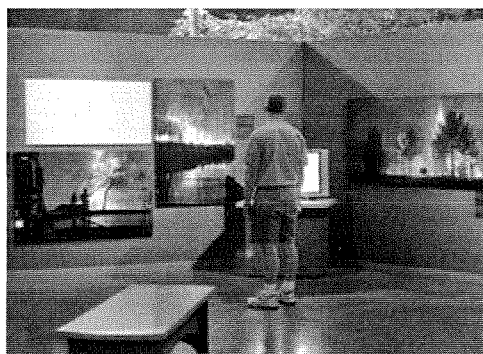
Do you live in a hotspot? • Why do you value nature? • Is fire good for healthy habitats?
• **How many species can we lose before an ecosystem collapses?**
• **Why not let wildfires burn? • What can you do to your house to reduce fire risk?**

Earth, Wind & WILDFIRE is a comprehensive exhibition that explores the powerful forces that shape the landscape of southern California: fire, nature, and people. This exhibition is a testimonial to the splendor of nature, the power and inevitability of fire, the responsibility humans have for living with nature and fire, and the inspiration of recovery in nature and the community.

"We hope visitors will come away with a sense of awe for both the splendor of nature and the power of fire, and with a sense of responsibility for living in this fire-dependent place," explained Exhibition [Co-curator Dr. Anne Fege](#). Designed to raise awareness of the history and inevitability of fire in southern California's arid and diverse wildlands, *Earth, Wind & WILDFIRE* employs objects, videos, photographs, and interactive displays.

Fire has the power of transformation. Change and transformation can be painful and can be filled with opportunity.

Read [exhibition opening statement](#) by Co-curator, [Nancy Owens Renner](#)



The purpose of *Earth, Wind & WILDFIRE* is to explore the powerful forces that shape our region—nature, fire, and people—and to ask, "*How can we co-exist with fire and nature?*" Co-curator Anne Fege suggests that visitors will leave the exhibition with these take-home messages:

Listen and Learn – Recorded Lectures

- *The Fire Environment*

- Fire Basics by Michael Scott, Rancho Santa Fe Fire Protection District

- Local Habitats by Mark Doderer, RECON Environmental

- Local Fire Ecology by Richard W. Halsey, California Chaparral Institute

(85 minutes).

- *Building Materials and Design*

- by Cliff Hunter, Rancho Santa Fe Fire Protection District (52 minutes).

- *Home and Community Site Design / Survivable Space and Fuel Management*

- by Terrance Lien, City of San Diego, Development Services

(32 minutes).

- The biodiversity of San Diego County is unparalleled, and uniquely adapted to low rainfall, rugged topography, and wildfires.

- Fires have become more frequent with growth in human population. When fire is too frequent in coastal sage scrub and chaparral ecosystems, habitats cannot recover and are converted to dramatically different types.

- With fire-wise planning and design of communities and structures, we can reduce risk to human life and property and preserve native biological communities.

- As humans, we can reduce our vulnerability to large fires by understanding and respecting the power of fire and the

value of nature, and by adjusting our developments and our lifestyles to the setting we choose to live in.

^TOP

Our Place on Earth—San Diego is a "hotspot."

- People love it here—where else might residents or visitors, on a summer day, walk in the desert shadows as the sun rises, hike in the cool shade of pine trees in a mountain meadow at noon, and stroll on the beach as the sun sets?
- The county is among the top ten "hotspots" for biodiversity in the U.S.; more species have been reported here than in any other county in the U.S.
- We have been a "hotspot" for rapid development for 60 years, resulting in elimination of many natural habitats and fragmentation of others.
- We are literally a "hotspot" with fire being part of this landscape for thousands of years. Fires are inevitable in San Diego County—the weather is warm, sunny, dry, and sometimes windy. When driven by Santa Ana winds, fire will burn until the winds stop blowing.

Nature adapts to normal fires. Many plants and animals are adapted to fire, with many different responses: some can escape and may recolonize later; some can regenerate from seeds or resprout; while others may be wiped out.

It is difficult for nature to recover from frequent fires. Our southern California ecosystems face threats to their health, even survival. Fires have become more frequent with growth in human population, creating a situation in which habitats cannot recover and are changed dramatically. When burned too frequently, whether by wildfires or

Fire is inevitable in arid Southern California. With extreme winds, firestorms (like hurricanes and earthquakes) are unstoppable.

prescribed burns, chaparral and coastal sage scrub will be taken over by highly flammable, weedy, non-native grasslands that burn even more often.

[^TOP](#)

The Power of Wildfire

Fires take on a life of their own. When Santa Ana winds are not blowing, these fuel- or topography-driven blazes are quickly suppressed, credited to the world's most experienced wildland firefighters. However, when these fierce winds create 60-mile-per-hour gusts and humidity is almost zero, wildfires burn out of control and quickly outstrip the firefighting resources until the weather changes.



[^TOP](#)

Living with Fire

People can learn to adapt to the inevitability of fire. Wildfires cannot be prevented, but we can prepare for them, as we do for earthquakes and floods. Loss of life and property can be minimized by planning low-fire risk communities, building survivable structures, and maintaining defensible space.

Drawing on our history and creativity, we can learn to live with fire and nature.

Dr. Anne S. Fege, co-curator of *Earth, Wind & WILDFIRE*, is currently a Botany Research Associate at the San Diego Natural History Museum. Dr. Fege retired on May 15, 2004, as the Forest Supervisor of the Cleveland National Forest, where she was responsible since 1991 for managing 450,000 acres in Orange, Riverside, and San Diego counties for watershed values, habitat for native plants and animals, recreation and other uses, wildland fire management, and open space. She is widely known as a co-founder of the San Diego Partners for Biodiversity and San Diego Fire Recovery Network, and recently earned a Masters in Business Administration at San Diego State University.

Nancy Owens Renner, co-curator of *Earth, Wind & WILDFIRE*, believes in the power of education to address social and ecological issues. Nancy has worked in museums for 16 years, designing, developing, and evaluating exhibitions. She has also worked for regional nature centers and conservation organizations, including Torrey Pines State Reserve, Chula Vista Nature Center, and the Catalina Island Conservancy. Her involvement with the Unitarian Cooperative Preschool, San Diego Cooperative Charter School, and the Institute for Learning Innovation has shaped her educational philosophy, which emphasizes empowering learners to explore and think critically and creatively. She is a member of the American Association of Museums, National Association of Museum Exhibition, Visitor Studies Association, San Diego Evaluators Group, and the California Native Plant Society.



[^TOP](#)



Exhibition made possible in part by  Semptra Energy utilitySM and  6 NEWS

Fire photos courtesy *The San Diego Union-Tribune*. Regrowth and nature photos courtesy Wendy Slijk.

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EXHIBIT 4

Mitigation Strategies for Reducing Wildland Fire Risks



San Diego County Wildland Fire Task Force
Findings and Recommendations

Report to the Board of Supervisors
August 13, 2003

EXECUTIVE SUMMARY

On August 13, 2002 (27), at the request of Supervisor Dianne Jacob, the County of San Diego, Board of Supervisors, directed staff to assemble a team of specialists to develop a comprehensive plan for managing wildland vegetation to reduce the severity of wildfires and decrease their impact on residents. Representatives from 24 agencies and organizations have met over the last year, conducting an in-depth analysis of wildland fire issues and developing a comprehensive wildland fire mitigation plan.

① The Task Force researched the history and complexities of wildland fires, including weather, topography, fuel (vegetation), multiplicity of owners/managers, wildland-urban interface, and the diseases and pests that can destroy trees weakened by drought. The Task Force members formed subcommittees to analyze major areas of concern and develop wildland fire mitigation recommendations in each area.

The Vegetation Management Subcommittee developed six recommendations regarding annual evaluations of fire risks, defensible space, weed abatement/fuel modification ordinances, grant funding, wildland fire rapid response teams and low cost insurance for prescribed burning.

The Codes and Ordinances Subcommittee developed five recommendations regarding property setbacks, venting and glazing requirements for new construction, weed abatement issues, fire hazards and review of regulatory compliance on County-owned, operated or controlled properties.

The Bark Beetle Management Subcommittee developed two

recommendations regarding grant funding for removal of dead and dying trees and establishing priorities for such tree removal efforts.

The Public Education Subcommittee developed four recommendations for education efforts regarding forest health, risks and responsibilities of those living in the wildland-urban interface, defensible space and reactivation of a UC cooperative extension position dedicated to wildland fuel management and education.

INTRODUCTION TO THE WILDLAND FIRE TASK FORCE

The San Diego County Wildland Fire Task Force was formed following the Pines Fire of July/August 2002 to address the continuing wildland fire problem facing the residents of San Diego County. The Pines Fire near Julian was the third largest fire in the County's history, consuming 61,690 acres, destroying 45 structures and damaging 121 structures. It cost an estimated \$22.6 million to extinguish.

Following the Pines Fire, the County Board of Supervisors directed staff to assemble a team of specialists from federal, state, and local agencies to develop a comprehensive plan for managing wildland vegetation to reduce the severity of wildfires and decrease their impact on county residents. Topics of specific review included establishing and maintaining firebreaks, performing prescribed burns, clearing hazardous brush, and organizing a "bug crew" to develop a plan to deal with problems associated with the County's bark beetle infestation.

On September 3, 2002, the Department of Agriculture, Weights and Measures sent a letter inviting various agencies and community groups to a meeting on September 18, 2002. A broad base of expertise was recruited including representatives from local, state and federal agencies, as well as members of local environmental groups. Representatives from 24 agencies and organizations attended that initial meeting to provide diverse expertise for an in-depth analysis of wildland fire issues and for the development of a comprehensive wildland fire mitigation plan. (A list of participating agencies and

other stakeholders can be found in Attachment II, and a list of the meetings held is provided in Attachment III.)

Due to the complexities of the issues and the large number of participants, Task Force members divided into subcommittees to develop a full spectrum of strategies that could be used to reduce wildland fire risks in the unincorporated area.

Vegetation Management – Investigate methods of vegetation management including fuel breaks, prescribed burning, mechanical clearing, biological brush control, and chemical brush control.

Codes and Ordinances – Review the existing codes relating to wildfires including building codes and vegetation clearance requirements around structures located in wildland-urban interface areas.

Bark Beetle Management – Investigate methods for bark beetle eradication or control.

Public Education – Expand strategies to educate the public on the essential steps for and the benefits of reducing fire risks.

This report of wildland fire issues and mitigation recommendations is generated from meetings held by the full Task Force, subcommittee meetings, and research of the scientific literature regarding the various issues addressed. A glossary of fire-related terms used in this report is provided in Attachment I. A bibliography of the resources utilized in the Task Force's research is shown in Attachment IV.

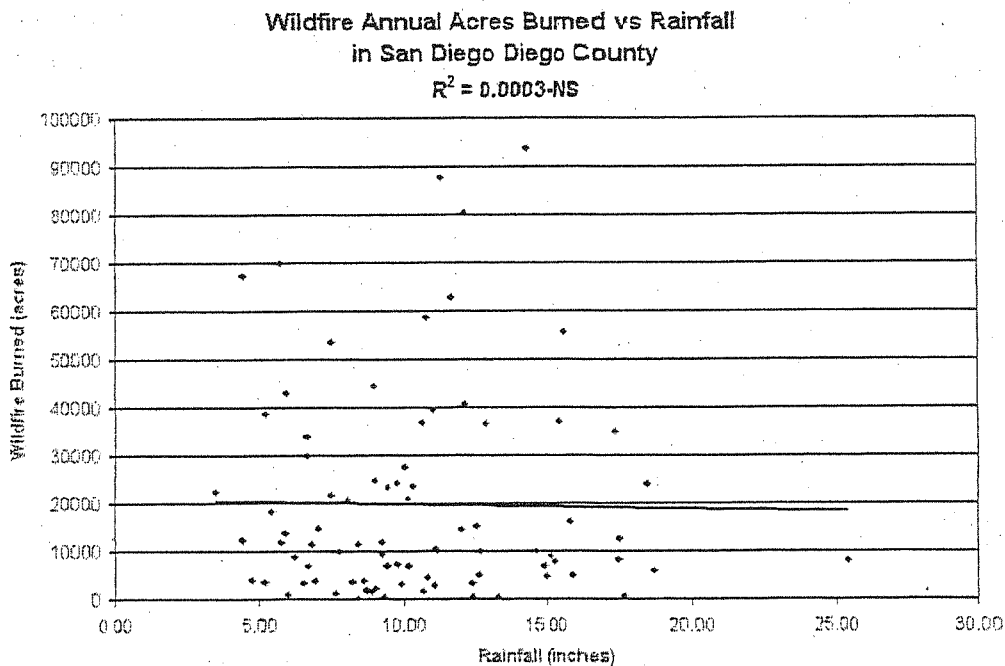


Figure 4.

Topography

Topography, or the “lay of the land,” greatly influences fire intensity and the direction of spread. Fires generally spread much faster up hill because convective heat rises, preheating the vegetation ahead. Aspect, or the direction that a slope faces, determines the type and moisture content of the vegetation. South facing slopes are drier and consequently have lighter vegetation than north facing slopes. Therefore, southerly exposures generally burn faster but with less intensity. Canyons and saddles funnel winds, increasing wind speed and consequently increasing fire spread. Consequently, homes built in steep, narrow canyons and at canyon rims face an increased risk from fires.

Fuel

Dr. Jon Keeley, mentioned above, argues that fires are wind driven events and more frequent smaller fires are not ecologically necessary. However, the preponderance of evidence favors fuel as the limiting factor.

Studies conducted by Dr. Richard Minnich of UC Riverside and Dr. Thomas Bonnicksen of Texas A&M conclude that fires in pre-European times were more frequent, less intense, and generally burned during the summer. They concluded that the age of fuel was the limiting factor in fire spread.

The vegetation in San Diego County’s fire prone area is primarily chaparral with some coniferous forests and oak woodlands. These vegetation types are fire-adapted, that is, they have evolved with fire and require fire to maintain healthy, functioning ecosystems.

During the last century, greater emphasis was placed on fire prevention, and professional firefighting forces continued to improve fire suppression methods. One side effect of those efforts was that the average age of wildland vegetation increased, and as it aged, it became increasingly dense. Recent studies indicate that southern California forests currently have three to ten times the vegetation density that existed 100 years ago. The increase in fuel density adds to the problem of controlling fires because more fuel results in more intense wildfires.

Recently burned chaparral and trees will not carry fire for five years post fire. From six to 20 years, these fuels can burn during extreme weather conditions. From 21 to 50 years these fuels will burn well under normal summer and fall conditions, making strong uphill afternoon runs but generally slowing down at night, allowing fire crews to gain control. After 50 years, the amount of dead branches and shrubs exceeds 50% of the available fuel, resulting in very hot fires, extreme fire behavior, long range "spotting" (throwing off embers ahead of the fire) and increased resistance to control. Add Santa Ana conditions to old fuel and the result is the classic southern California firestorm.

At UCLA, two mathematicians (Peng and Schoenburg) analyzed the Los Angeles Malibu fire regime from a statistical and physics perspective. They were aware of the debate over fuel-driven fires versus wind-driven fires and they concluded that, statistically, fuel was the limiting factor. Their illustration below provides a dramatic illustration of the difference between a landscape shaped with almost no fire suppression activity in Baja California compared to San Diego County's landscape, where highly efficient fire suppression forces are employed. Fires in Mexico rarely

exceed 10,000 acres although fire starts are abundant. (See Figure 5.)

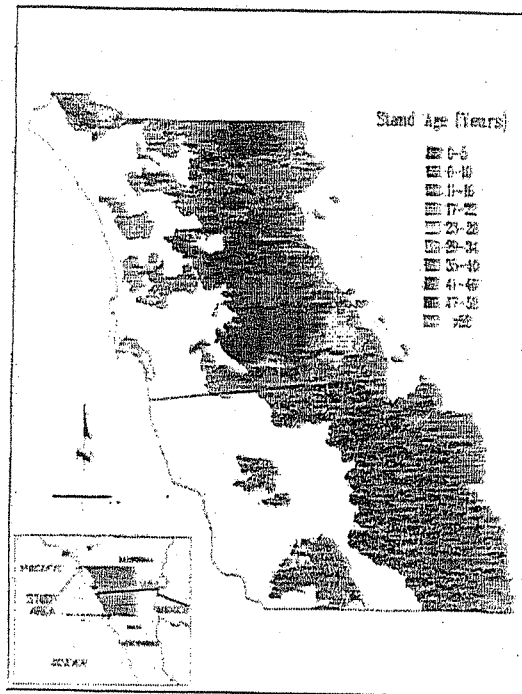


Figure 5. Map comparing fire size of San Diego County and Baja California 1971 (utilizing the most recent comparative data available).

Frequent smaller fires result in a mosaic of differing aged vegetation, so fires become somewhat self-limiting. San Diego's huge areas of aged fuel, on the other hand, can lead to vast acreages burning in a single summertime event like the 61,690 acre Pines Fire of 2002 or the 62,000 acre Conejos Fire of 1950. Santa Ana winds and old fuel can result in conflagrations like the record-setting 190,000 acre Laguna/Boulder Fire of 1970.

Presently, almost one-half of the vegetation in San Diego County's wildland is over 50 years old. Another 30% is over 20 years old. This means that almost 80% of the wildland areas in San Diego will burn

explosively under typical periods of high fire danger. (See Figures 6 and 7.)

San Diego County Fuel Age Classes		
Age	Wildland Acres	Percent of Wildland Acres
0-20 years	290,508	21.54%
21-50 years	413,113	30.63%
51+ years	645,009	47.83%
Total	1,348,630	100.00%

Figure 6.

Wildland Management Responsibility

One of the significant complexities of wildland management is the multiplicity of owners and land managers. Because land management responsibilities are divided between these groups, effective public

education and ongoing interagency coordination are critical for effective fire mitigation efforts countywide.

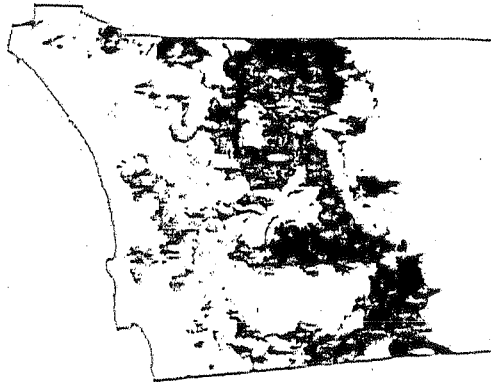


Figure 7. Vegetation older than 50 years.

The chart below shows responsible parties and the number of wildland acres with 50+ year-old vegetation under their control. (See Figure 8.)

Ownership of land with fuels over 50 years old*			
OWNERSHIP	ACRES	SQ MILES	PERCENT
Private	246,592	384.56	38.23%
U.S. Forest Service	122,205	190.86	18.95%
Tribal Lands	73,213	114.39	11.35%
California Department of Parks and Recreation	66,856	104.46	10.37%
Bureau of Land Management	65,508	102.34	10.16%
Water Districts	26,188	40.78	4.06%
Cities	12,214	18.93	1.89%
Military Reservations (Camp Pendleton, Miramar)	12,242	19.11	1.90%
County Parks and Open Space	12,106	18.84	1.88%
State	4,775	7.46	0.74%
State (CalTrans)	1,126	1.66	0.17%
California Department of Fish and Game	931	1.46	0.14%
U.S. Fish & Wildlife Service	331	0.52	0.05%
Other	720	1.02	0.11%
Totals	645,009	1006.41	100.00%

Figure 8. * Based on the most recent GIS layer.

The set of four maps below shows the geographic distribution of wildlands with fuel over 50 years old in San Diego County by responsible land manager. (See Figure 9.)

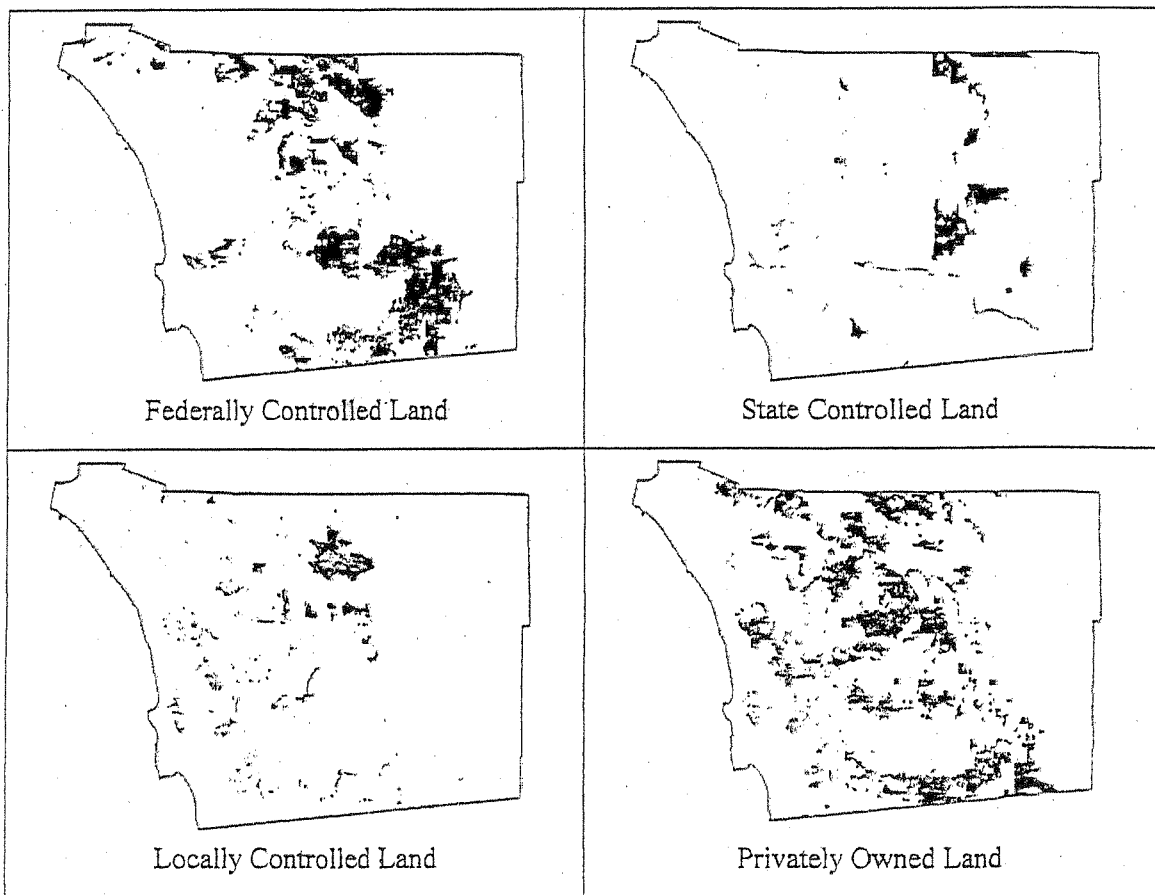


Figure 9. Wildlands with fuel over 50 years old.

Wildland-Urban Interface

The addition of hundreds of new houses each year to “wildland-urban interface” areas adds to the complexity of wildland fire mitigation. These structures may limit the ability of fire managers to pick the most effective location to stop wildland fires and may require firefighters to limit perimeter control activities in order to concentrate on defending homes. The situation is further complicated when homeowners have not maintained an area of reduced vegetation around their homes. This “defensible space”

around structures allows firefighters a safe place to operate under the extreme fire conditions that accompany many recent wildfires.

Flammable roofing material is perhaps the most significant factor in the loss of homes in wildland-urban interface fires. Shingles not only catch fire easily, they break free and sail upward to be deposited as fire-starting embers downwind. Conclusions below regarding major factors in wildland-urban fires put flammable roofing material at the top of the lists. Fortunately, building

VEGETATION MANAGEMENT

This subcommittee agreed that fuel or vegetation management is probably the single most effective tool available to mitigate fires. Prescribed burning, chemical treatment, mechanical treatment, biological treatment, fuel breaks, and defensible space around structures are all forms of vegetation management.

Methods of Reducing Vegetation

Prescribed Burning

Prescribed burning is the intentional introduction of fire, under favorable weather and fuel conditions, in order to remove old vegetation (fire fuel). Some experts believe that prescribed burns, set under carefully monitored conditions, can safely remove old fuel and present a barrier to the spread of wildfire while minimizing erosion potential and improving habitat. However, other experts believe that any man-imposed action upon wildlands is unnecessary and possibly detrimental.

Proponents of prescribed burning observe that in areas with more frequent fires, especially forests and woodlands, vegetation tends to consist of fewer but larger trees, enhancing drought survival capabilities. In addition, some studies have shown that more frequent, smaller, and less intense fires favor animal populations by increasing plant and habitat diversity.

The U.S. Forest Service has successfully conducted prescribed burns on lands north of Pine Valley and on the eastern slopes of

Palomar Mountain. However, private landowners sometimes are reluctant to allow projects on their lands due to liability concerns. Therefore, some large beneficial projects are halted because one landowner refuses permission to allow his/her land to be burned.

Currently, in San Diego County, all land management agencies annually perform prescribed burns on less than 3,000 acres total. Proponents estimate 27,000 acres annually would be needed to have a significant impact on the fire situation.

Chemical Treatments

Herbicides have been successfully used to convert some chaparral-covered areas to grasslands and to reduce the understory vegetation load in forests. They may have some use in maintaining clearance around structures and in reducing the cost of maintaining fuel breaks. Herbicides can provide advantageous affects when applied to cut brush stumps to maintain clearance around structures. However, the policies of many land management agencies preclude pesticide use in quantities large enough to have any significant impact on the overall fuel problem.

Mechanical Treatment

Mechanical methods of vegetation management include bulldozing, crushing, chaining, large brush crushers, other specialized devices, and hand clearing. Many of these methods rely on burning the crushed brush in the winter during periods of damp weather. Hand cutting or "chipping," with the chips being reapplied to the site, is feasible for small areas but

One of the lessons learned from the pilot program is to prioritize the limited chipper availability based on risk factors. Local fire districts or the local wildland agency would be better positioned to set community priorities for chipping services.

Options for future chipping programs include:

- Purchasing chippers with grant funds for individual fire districts or community-based groups. Issues of operator training and liability would need to be addressed if the machine were not operated by district personnel.
- Using grant funds to contract with private companies to provide community "chipper days." Days would be scheduled, community groups and members notified, and residents would cut and stack for chipping ahead of time.
- Developing and implementing a system of partial cost sharing, with residents paying a portion or all of the costs. Government would provide the service directly or with contracted help, charging on a cost recovery basis. Economies of scale would allow efficient use of resources, reducing costs to residents. Reduced costs may encourage residents to maintain their vegetation in a fire-safe manner.
- Some combination of all of the above could be implemented. San Diego County is diverse geographically and biologically. One method that would work in a mountain community may not be successful in an inland valley community.

Recommendations

Recommendation 1. At the end of each fire season, evaluate the status of fire risks for San Diego County, and as appropriate, prepare a status report of mitigation efforts accomplished in the prior year for the Board of Supervisors.

Recommendation 2. Continue to enforce legal requirements for defensible space (fuel modification zones) around structures.

Recommendation 3. Develop model weed abatement and fuel modification ordinances for existing structures located in wildland areas.

Recommendation 4. Continue to seek grant funds for chipping while exploring the various cost-saving chipping program options listed above.

Recommendation 5. Research options for providing low cost insurance to cover landowners who allow prescribed burning on their lands.

Recommendation 6. If wildland fire damages personal property, continue to assist residents whose property has been damaged or destroyed by providing a rapid response multi-departmental damage assessment team.

EXHIBIT 5

News Release

U.S. Department of the Interior
U.S. Geological Survey

Address

7801 Folsom Blvd., Suite 101
Sacramento, CA 95826

Release

June 10, 1999

Contact

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USGS Study Casts Doubt on Role of Fire Suppression in Causing Catastrophic Shrubland Wildfires

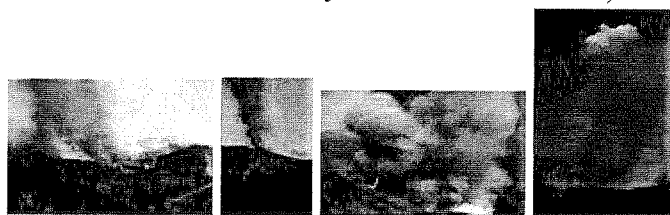
NOTE TO NEWS EDITORS: Reproducible photos for this release may be found at:

<http://biology.usgs.gov/pr/newsrelease/1999/6-8d.tif> (The Bel-Mar Fire in the Santa Monica Mountains chaparral, Los Angeles County, California, June 29, 1988. Photo courtesy U.S. Forest Service.)

<http://biology.usgs.gov/pr/newsrelease/1999/6-8e.tif> (Example of a high-intensity chaparral fire in California, 1968. Photo courtesy U.S. Forest Service.)

<http://biology.usgs.gov/pr/newsrelease/1999/6-8f.tif> (Example of a high-intensity chaparral fire in California. Photo courtesy U.S. Forest Service.)

<http://biology.usgs.gov/pr/newsrelease/1999/6-8g.tif> (Example of a high-intensity chaparral fire in California. Photo courtesy U.S. Forest Service.)



It is well known that fire suppression in forests has led to an increase in catastrophic forest fires. The same has been assumed to be true for fire suppression in shrublands. However, a recent USGS study has found that urban sprawl -- not fire suppression -- is largely responsible for the wildfires that occur in the shrublands of southern and central-coastal California.

The study has major implications in this region of the state because of the rising loss of lives and property due to shrubland wildfires, which has caused the state's resource managers and the public to become increasingly concerned with solving the problem of wildfire destruction.

A recent article in the journal *Science* refutes the view that fire suppression in shrublands of southern and central-coastal California has led to catastrophic wildfires. To the contrary, in "Reexamining Fire Suppression Impacts on Brushland Fire Regimes," U.S. Geological Survey scientist Jon Keeley of the USGS Western Ecological Research Center in Sacramento and his colleagues C. J. Fotheringham of California State University, Los Angeles, and Marco Morais, formerly of Santa Monica Mountains National Recreation Area, reinforced an earlier view that the problem of wildfire destruction started with population growth into the foothills.

The authors found that fire suppression plays a role in limiting the impacts of shrubland wildfires. In the last 50 years, humans have greatly increased the frequency of fires, beyond the limits of the ability of the native shrublands to rebound from the effects of these fires, said Keeley. Consequently, native shrublands are being replaced or converted to nonnative or exotic grasslands. Fire suppression counteracts this impact by extinguishing the many fires started by people.

In their article, the authors concluded that wildfire management should focus on strategic locations instead of on the chaparral landscape at large. Intensive management, said Keeley and his colleagues, should occur at buffer zones where urban lands and wildlands meet. They suggested that buffer zones be selected based on the landscape features that the worst wildfires predictably follow. However, they warned that even with such management, ecological impacts may be enormous because of the already-extensive size of the still-growing urban-wildland buffer zones.

Two views exist regarding the primary cause for the frequent devastating fires that occur in many counties in California, said Keeley. The first, dating from the 1950s, cites urban expansion and lack of adequate zoning regulations as the cause of the problem. By the 1970s, though, an alternate view emerged that fire suppression was the primary cause of increased losses due to shrubland wildfires. The scientific community widely believed that state and federal fire suppression programs have allowed fire fuels of thick underbrush to accumulate, leading to fewer but larger and more intense wildfires.

Based on this line of reasoning, many scientists have argued that a link exists between fire size and fire suppression. They blamed large wildfires on fire suppression and hypothesized that wildfires could be prevented by creating a landscape patchwork of different-aged vegetation. They asserted that fire suppression has resulted in fewer fires than in the past, that fires are now larger and of higher intensity, and that large fires result from shrub stands that are very old. In addition, they said that there has been a decline in the total area burned by these fires when compared with fires that occurred under more natural historical fire patterns.

"These hypotheses are undocumented," said Keeley. "In fact, large high-intensity wildfires are a natural feature of the chaparral landscape, and there is no evidence they are an artifact of modern fire suppression practices."

In contrast to coniferous forests, where fire suppression has indeed led to hazardous accumulation of fuel, and the potential for unnatural catastrophic fires, fire suppression in the brushlands of southern and central-coastal California has not altered the natural fire cycle, said Keeley.

To determine the role of fire suppression in shrubland wildfires, Keeley and his colleagues investigated historical changes in fire regimes from the 19th century onwards, by using the recently available California Statewide Fire History Database. This database contains records from the California Department of Forestry, U.S. Forest Service and other county records. The researchers analyzed counties dominated by shrublands subject to periodic high-intensity (stand-replacing) wildfires -- from north to south, Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, San Bernardino, Riverside, Orange, and San Diego counties.

Their investigation revealed several important facts. First, the researchers found that not only has the number of fires per decade increased, but also, during the period of the study, no significant decline in area burned has occurred. The number of fires and area burned increases as population density increases. Additionally, the historical records showed that very large fires have been reported since the start of record keeping in 1878, and that there has been no increase in the average size of wildfires. Indeed, said Keeley, the average wildfire size has significantly declined in four counties.

When Keeley and his colleagues examined the different age classes of shrublands burned in large wildfires (those exceeding 12,000 acres) during the last 30 years, they found that almost 40 percent were between the ages of 11 and 20 years and the size of the fires did not depend on the age of the shrub stand. This contradicts the commonly held belief that young stands less than 20 years of age prevent fire from spreading over large areas. Fire rotation intervals -- the time it takes to burn the equivalent of the total shrublands within any given area -- has decreased in all but two counties. This, coupled with the fact that throughout this century September has remained the peak month of wildfires, implies that fire intensity also has not increased in recent decades.

Keeley noted that most wildfires are carried by Santa Ana winds, which occur in the fall during periods of low humidity and which often exceed 60 miles per hour. Such wildfires burn through both young and old age classes of shrubland, which means, said Keeley, that attempts to alter vegetation age structure across large landscapes in the hope of managing these wind-driven fires is unlikely to stop catastrophic fires.

As the nation's largest water, earth and biological science and civilian mapping agency, the USGS works in cooperation with more than 2,000 organizations across the country to provide reliable, impartial, scientific information to resource managers, planners, and other customers. This information is gathered in every state by USGS scientists to minimize the loss of life and property from natural disasters, contribute to the sound conservation, economic and physical development of the nation's natural resources, and enhance the quality of life by monitoring water, biological, energy and mineral resources.

* * * * USGS * * * *

This press release and in-depth information about USGS programs may be found on the USGS home page: <http://www.usgs.gov>. To receive the latest USGS news releases automatically by email, send a request to listproc@listserver.usgs.gov. Specify the listserver(s) of interest from the following names: water-pr; geologic-pr; geologic-hazards-pr; biological-pr; mapping-pr; products-pr; lecture-pr. In the body of the message write: subscribe (name of listserver) (your name).
Example: subscribe water-pr joe smith.

URL: <http://www.werc.usgs.gov/news/1999-06-10.html>
Last update: 11 March 2003

EXHIBIT 6



FOR IMMEDIATE RELEASE

May 8, 2007

FACT SHEET

FY08 Budget

SANDERS ADDS \$5.32 MILLION TO FIRE-RESCUE DEPARTMENT BUDGET

*FY08 Budget Enhancements Will Help Address Facilities,
Fleet and Equipment Needs*

MAYOR URGES SAN DIEGANS TO BE VIGILANT IN CLEARING AWAY BRUSH FROM RESIDENCES AND BUSINESSES

Driest Conditions in 90 Years Raise Concerns for Firefighters Statewide

Mayor Jerry Sanders announced today that as part of the Fire-Rescue Department's proposed \$180 million FY08 budget, \$5.32 million represents enhancements to help address the City's ongoing fire, rescue and life-safety needs.

The Mayor also urged San Diegans to be ever vigilant in clearing brush away from residences and businesses. California is experiencing its driest conditions in 90 years, prompting concern from fire officials across the state about a potential increase in fire danger.

San Diego has already experienced six vegetation fires this year during cold and foggy conditions. As the City heads into warmer, dryer weather, the chance for canyon and wild fires increases. Property owners can help decrease the risk of fire by effectively clearing brush that exists within 100 feet of structures. A copy of the City's Brush Management Guide appears on pages 3-4 of this Fact Sheet.

The Mayor's budgetary enhancements underscore his commitment to keep public safety a top priority even during difficult financial times. Elements of the enhancements include:

- **Fleet replacement and additions for the Fire Rescue Department (\$1.96 million).** Long overdue, the Mayor is focusing attention on replacing outdated fire vehicles, including the replacement of two unreliable and substandard water tenders that are over 26 years old (\$500,000). Replacement will ensure an adequate and timely supply of water when hydrants

are not available. Also being replaced are: the department's only front-line emergency response foam apparatus (\$600,000), 15 emergency response-capable staff vehicles (\$491,000), five aged mid-size emergency response capable staff vehicles (\$74,650), two Battalion Chief vehicles (\$130,000), one aged and repair-prone callback response vehicle (\$40,000), three 2-wheel-drive support function pickup trucks (\$58,000); and the addition of five midsize sedans (\$65,190).

- **Fire Department Equipment Enhancements (\$1.07 million).** For years, the Fire Rescue Department has gone without critical equipment. While acknowledging that this will not address or solve all of the equipment needs, the Mayor believes that this is a step in the right direction. Chief among the enhancements are full funding for the helicopter/hoist lease-purchase payments (\$341,100), three compressed breathing air refill units to be installed in fire stations (\$169,682), 70 complete turnout sets (fire retardant coats and pants) (\$140,000), the replacement of outdated 800MHz mobile radios on all apparatus (\$83,262), and the repair and replacement of vehicular exhaust and extraction systems on vehicles as needed (\$75,000).
- **Partial-year staffing for the new, developer built Fire Station 47 in Pacific Highlands (\$1.17 million).** Set to open in late fall 2007, this fire station will service communities in the rapidly growing Carmel Valley area. It is anticipated that the addition of this station will dramatically reduce fire and life safety service response times in this region.

SAN DIEGO FIRE RESCUE DEPARTMENT

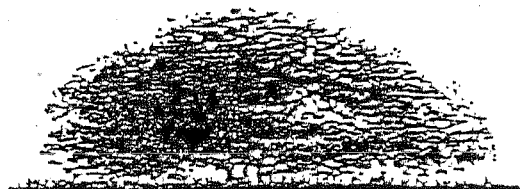
ITEM CATEGORY	BUDGET ENHANCEMENT AMOUNT
Partial Year Staffing for Newly Built Fire Station 47	\$1.170 million
Fleet replacement and additions	\$1.96 million
Equipment Enhancements	\$1.07 million
JPA HIRT Program	\$143,900
Fire Personnel Training	\$66,980
Information Technology Needs	\$35,500
Lifeguard Staffing	\$291,091
Lifeguard Training	\$587,000
TOTAL ENHANCEMENTS	\$5.32 million

HOW TO THIN AND PRUNE BRUSH IN ZONE 2

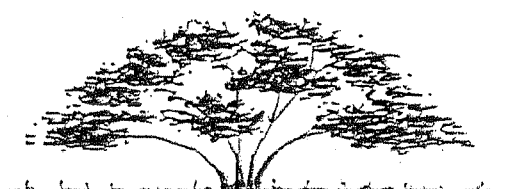
Step 1: Removeas much of the dead wood as you can.

Step 2: Prunetall vegetation like chaparral by cutting and shaping larger plants into "umbrellas." This means pruning away the lower branches—about half—of plants over 2 feet high to create umbrella-shaped canopies. If you can, it's a good idea to prune the lower branches of all the larger plants. This allows you to see and deal with what is growing underneath. Do not prune the tops of plants, just the lower branches. This keeps the plant healthy, and the shade from the plant canopy reduces weed and plant growth underneath. In vegetation that is less tall, like coastal sage scrub, you may not need to do Step 2.

- BEFORE -



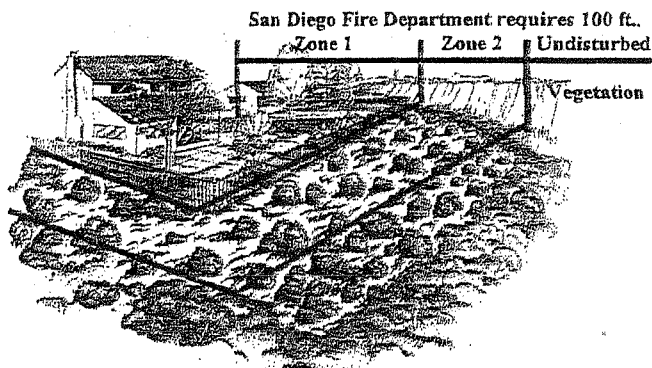
- AFTER -



Step 3: Thinthe entire Zone 2 area. This means cutting down no more than 50% of the plants over 2 feet high to a height of 6 inches, and may include some of the plants you pruned in Step Two. Don't go any lower than 6 inches so the roots remain to control soil erosion. The goal is to create a "mosaic" or more natural look, as shown below, so do your cutting in a "staggered" pattern. Leave uncut plant groupings of 400 square feet—that's a 20 x 20-foot area, or an area that can be encircled by an 80-foot rope—separated by groupings of plants cut down to 6 inches.



Before Brush Management



After Pruning and Thinning

Step 4: Disposeof the cuttings and dead wood by either hauling it to a landfill; or, by chipping/mulching it on-site and spreading it out in the Zone 2 area to a depth of not more than 6 inches.

Step 5: Prune annuallybecause plants will grow back. You can also "nip it in the bud" by rubbing out the buds on plants in the spring to keep from having to prune and thin as often.

Note: See *Bulletin #2: Use of Goats for Brush Management*, for an alternative way to thin brush.

Additional Information

- Brush/Weed Abatement; use of goats: City of San Diego Fire-Rescue Department (619) 533-4444.
- Property restrictions (easements, permits, deed or title): County Recorder (619) 237-0502.
- Obtaining permits for brush management on private property with restrictions: City of San Diego Development Services Department (619) 446-5000.
- Brush Management on City-owned open space land: City of San Diego Park and Recreation Department, Brush Management Section (619) 525-8607.

*Authority: City of San Diego Municipal Code Chapter 14, Article 2, Division 4, Sections 142.0402, 142.04030, 142.0412.

Revised 02/10/06 (San Diego Fire-Rescue)

EXHIBIT 7

The Cedar fire: a question of blame?

By Richard W. Halsey
July 22, 2004

On your next excursion to Julian, stop at the Inaja Memorial just up the hill from Santa Ysabel. Take a moment and read the bronze plaque listing the 11 firefighters who were killed while battling the Inaja fire on Nov. 25, 1956. The incident report published after the disaster recommended "that a better knowledge of fire behavior must be developed as an essential means of preventing future fire tragedies."

The Cedar fire of October 2003 started approximately five miles southwest of where the Inaja fatalities occurred, in the same type of vegetation and rugged terrain. Consequently, San Diego-area fire commanders knew the risks involved when they arrived on scene with approximately 350 fire control personnel within an hour of the Cedar fire being reported: impenetrable, 12-foot-high chaparral, steep canyon walls and approaching Santa Ana wind conditions. Not a lot could be done without risking the lives of hundreds of firefighters. Then the winds picked up, blasting an explosive inferno across 18 miles by early the next morning. It was an unstoppable force.

Nine months later, after listening to grandstanding politicians, ill-informed radio commentators, and now attorneys of the Allstate Insurance Company who are considering suing local firefighting agencies for not "dispatching appropriate firefighting efforts at the incipient stage" of the Cedar fire, one would think the entire disaster was caused by the California Department of Forestry and Fire Protection. According to one of Allstate's lawyers out of Chicago, "Little or nothing was done in the process when this fire was very, very approachable." Really? One wonders if this attorney has ever confronted 100-foot flames screaming down on him during a California brush fire.

The Cedar fire was reported at 5:36 p.m., Oct. 25. Claims of earlier calls have never been corroborated. Being able to assemble 350 fire control personnel into the backcountry within an hour of the report is hardly an inadequate response.

The debate over calling back the Sheriff's Department helicopter with its thimble-full bucket of water demonstrates more about political hype than understanding how fires are fought. No fire in North America has ever been put out by aircraft alone. To be effective, aerial water drops need ground personnel to complete the work.

In the case of the Cedar fire, ground crews could not safely reach the fire site. Based on the detailed computer modeling performed by the U.S. Forest Service, assuming 100 percent accuracy of helicopter water drops, aerial support would only have been effective in knocking down a third of the Cedar fire at best.

Those criticizing the decision to call back the sheriff's helicopter due to safety regulations really have no idea what they are talking about. Flying at dusk with a 1,000-pound bag of water dangling 15 to 25 feet below an aircraft, with electrical lines strung across the landscape, uncertain wind conditions and a next-to-zero chance of the mission producing desired results are not the variables conducive to acceptable risk.

So is there anyone we can blame for the Cedar fire? Firefighting agencies are easy targets because they have been charged with the task of protecting us, but at what cost? A resident from the Mussey Grade community, north of Poway, shouted out during a Ramona Water Board meeting that there should have been more firefighter fatalities if they had been doing their job right. Some folks in the Crest area claimed the fire department let their homes burn.

Let's make something perfectly clear. We live in a fire-prone environment. Nothing we can do will change that. Fire officials constantly warn us about the risks, yet we typically choose to ignore them.

One reason San Diego Fire Chief Earl Roberts resigned in 1984 was due to his frustration over the community's lack of concern of the severe fire danger present in the city. It does not take much imagination to see what could happen to Clairemont Mesa under conditions similar to the 1991 Oakland Hills fire. During a few hours, 2,900 homes were lost, one igniting every 11 seconds. During that type of event, pushed forward by Santa Ana winds, it won't matter how many helicopters San Diego County has on line.

If there is any blame for the lives and homes lost during the Cedar fire, it initially falls on the developers who built communities in high fire-risk areas and those government leaders who permitted it. But blaming doesn't get us anywhere in terms of trying to solve the fire danger we are facing today.

The ultimate responsibility for fire safety lands squarely with individual homeowners. It is their duty to do everything they can to retrofit existing structures with low fire-risk features: boxed eaves, double-glazed windows, ember-resistant attic vents, sealed gaps between roof tiles and deck, and no exposed wood surfaces, including fences and roofing.

In areas with extreme fire danger, rooftop misters or sprinklers supplied by an independent, on-site water source will also help. And most importantly, regularly maintained defensible space around the home to prevent ignition by direct heat.

The structure of defensible space, however, is critical. Simply "clearing" the land as San Diego County has recommended may create a worse situation by encouraging the growth of weedy annuals, considered flashy fuels due to their ease of ignition. It is best to reduce fuels in the 30-to 100-foot zone (depending on the situation) away from the home by heavy trimming rather than disturbing soil with aggressive clearance. And keep the pine and Eucalyptus trees far from any structure; they can be explosive. Don't put the lives of firefighters at risk trying to defend the indefensible.

We've learned a lot since the Inaja fire of 1956. Fires, when they come, are often multiple events taxing fire management resources. Chances are, firefighters are not going to be able to get to your home in time during a large event. Make it safe. Make it defensible. Let the fire burn around you. It's your responsibility.

■ Halsey is a field biologist who has studied chaparral for more than 20 years.

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EXHIBIT 8



San Diego Municipal Code

Land Development Code

Biology Guidelines



Printed on
recycled paper

This information, or this document (or portions thereof), will be made available in alternative formats upon request.

In general, areas within the MHPA are considered to have long-term viability. Areas outside of the MHPA proposed for mitigation may require additional biological studies to support the determination of long-term viability.

Mitigation Methods:

- (a) Off-site Acquisition. The purchase or dedication of land with equal or greater habitat value can be considered as a method of mitigation. Impacts within the City of San Diego must be mitigated within the City of San Diego's jurisdiction, preferably in the MHPA.

"Mitigation Banks" are privately or publicly held lands that sell mitigation credits instead of fee title for habitat areas on which a conservation easement has been placed. Under this method, a large site can be acquired over time by multiple projects requiring small mitigation needs. Purchase of areas of "credits" from an established bank can be acceptable, as long as the required acreage is subtracted from the remaining credits in the bank and is not available for future projects. All banks must have provisions approved for long-term management, be part of a regional habitat preserve system and upon request provide an updated record of the areas (credits) purchased from the bank and those that are remaining.

New mitigation banks must be established pursuant to the "Official Policy on Conservation Banks" (California Resource Agencies 1995) and the "Supplemental Policy Regarding Conservation Banks within the NCCP Area of Southern California (USFWS 1996). In general, the purchase of credits from mitigation banks located outside of the City of San Diego's jurisdiction will not be allowed.

- (b) On-Site Preservation. The following provides guidance for evaluating the acceptability of on-site preservation as mitigation with respect to the long-term viability of the site.

- (1) Inside MHPA: For premises that straddle the MHPA, the on-site preservation of lands inside the MHPA, outside of brush management zones, are considered to have long-term viability due to their connectivity to larger planned open space and their contribution towards regional biodiversity preservation. Areas containing brush management Zone 2 will be considered impact neutral (not considered an impact and not considered acceptable as a mitigation area); see **Figure 3**.

Land inside the MHPA, outside of brush management zones, will be considered acceptable as mitigation and no additional studies to support this determination will be required.

EXHIBIT 9

Protecting Your Home From Fire

Why we are concerned about over exuberant "clearance" regulations...

To minimize the threat of fire,
"we must reduce the amount of brush covered lands."
- From a regional fire management plan in California

A number of politicians support changing California state law
to **require** homeowners to "clear" vegetation 300 feet around their homes
(**nearly the length of a football field**).

There is no question that vegetation around homes can pose a risk to both communities and the firefighters asked to protect them. However, by demanding that citizens unilaterally clear their properties over such extreme distances, destroying garden landscapes and valuable habitat, policy makers are failing to recognize the true nature of fire. In addition, such unreasonable demands unfairly infringe on private property rights.

The proposed 300' clearance requirement has ZERO scientific validity.

Most homes **do not burn** from an imagined "wall of flame," but rather **from embers that can travel up to two miles** ahead of the flame front. How to reduce fire risk is not a one answer question. **Excessive clearance zones will not protect poorly designed homes** from embers during a typical Santa Ana wind driven firestorm.

In fact, excessive clearance zones can actually *increase fire risk* by causing the growth of flammable weeds and creating a clear pathway for embers to impact structures.

**We can create fire-safe communities
without destroying the natural landscapes we enjoy.**

[Click here to read how to respond to fire risk in a balanced manner by considering the ENTIRE fire risk equation.](#)

We do not need to clear nature down to the dirt.



Is this the environment we want to live in? 300 feet of dirt.

Creating a "Survivable Space" Around Your Home: The Difference Between Rational Action and Overreaction

Dense and flammable vegetation needs to be removed from the area immediately around a home in order to reduce the risk of structural ignition during a wildfire. The question is how to properly do so without causing additional problems. The basic rule is to eliminate flammable materials (fire-prone vegetation, wood stacks, wood decking, patio furniture, umbrellas, etc.) from within 30 feet of the home. Then for structures near wildland open space, an additional 70 feet should be modified in such a way as to remove dead wood from shrubbery, thin and trim trees and shrubs (lower limbs removed), and prevent the growth of weedy grasses. Maintaining a modified canopy of vegetation to shade the ground is important to reduce weed growth.

Unfortunately the term "clearance" is used in California state law when referring to this 100 foot zone, leading people to think all vegetation must be removed down to bare soil. This is why the city of San Diego Fire and Rescue Department has replaced the word "clearance" to "thinning" when referring to vegetation management around homes. Officials in the California Department of Forestry and Fire Protection (CDF) are continually trying to help citizens understand that clearance doesn't mean the removal of all native plants. Bare soil clearance not only unnecessarily compromises large amounts of native wildlands and increases erosion, but will lead to the growth of weeds in the now disturbed soil. These weeds are considered "flashy fuels" which actually increase fire risk because they ignite so easily.



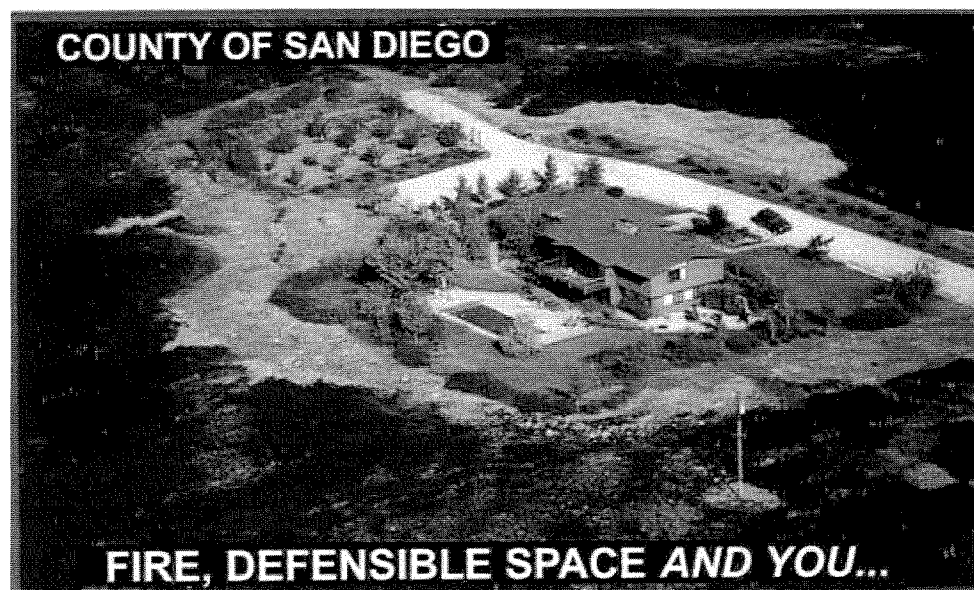
If fire risk and natural resource value had been properly considered, this house would never have been permitted. This shows why proper land planning is so important. Trying to reduce fire risk by "clearing" in this situation would cause much more public resource damage than the structure is worth.



San Diego Mission in the late 1880's. As a counterpoint to the photo above, this type of "clearance" to mineral soil will certainly reduce fire risk, but is this the type of environment in which we want to live? The conditions here were the result of excessive grazing, repeated burning, and wood collecting.



A classic example of massive over-clearing in San Marcos, San Diego County. When do the total costs of such action exceed the assumed benefits? Although the total fuel load has been reduced, the amount of highly flammable fine, flashy fuel has been increased dramatically.



WHAT'S WRONG WITH THE ABOVE PHOTO?

This photograph has been used as proof that excessive clearing will save your house from a wildfire. It ignores other important variables. While some may think the "best" way to reduce fire risk is by stripping down to bare ground wide areas around your house and replacing part of it with lawn or ice plant as shown above, the important question to ask is **"considering the total costs, is this the most effective way to protect my house?"** The answer is No. It may be the easiest approach politically, but by no means does it guarantee your safety.

WHY?

1. The primary mechanism for homes igniting during a wildfire is glowing embers. Embers can travel a mile or more from the fire front. This is why wildfires jump ten-lane Interstate Highways and over large lakes. The reason the home above did not burn down could have been due to the presence of firefighters, shift in the direction or speed of the wind, fire resistant construction, time of day the fire reached the property (evening weather typically moderates fires), or just simple probability. We do not know from just looking at this photo.

2. The concept of "defensible space" by itself is not an adequate solution for Southern California. It presumes wildfires are small and firefighting resources will always be available. This is not realistic. The most damaging wildfires are typically large events that tax firefighting agencies. Chances are there may not be a firefighter available to use the defensible space. It is best to create a "survivable space" in which **the home can survive on its own**. This means fire-safety needs to focus on fire-resistant construction as well as proper vegetation management.

3. Striping the land of native vegetation as the owner did above leads to erosion and the growth of invasive weeds. Weeds demand continual maintenance to control. Once dried, they pose an extended fire risk since **they are much more flammable** than properly thinned native vegetation. See the impact of such type-conversion on our [Threats to Chaparral](#) page.

4. Lightly irrigated, properly thinned and spaced shrubs can act as a "green" fire barrier, absorbing heat and deflecting oncoming embers. Bare, open space can not do this.

5. There are a number of reasons one decides to live next to a natural environment; peacefulness, enjoyment of wildlife, uncluttered vistas, native wildflowers, a chance to take an evening stroll through nature. While surrounding one's self with ice plant and other non-native additions may appeal to some, it is generally not supportive of these types of values. Although an easy target, native vegetation is not the enemy. We are next to it because of it. Therefore, it makes sense to build a home that is adapted to the environment in which it exists. Consequently, the first place to start when trying to protect your home from wildfire is **from the structure out, not from the wildland in** which includes:

a. Proper attic vent construction (to keep out embers), non-combustible roofing (to resist embers), enclosed eaves (to defend against embers), and the removal of flammable objects such as wood fences, patio furniture, wood decking, etc. (to prevent ignition by embers).

b. Making sure the first 30 feet around the home is free of flammable materials and is landscaped with fire resistant vegetation is the next step. Pines, palm, and Eucalyptus trees do not belong anywhere near a house.

c. The next 70 feet **should not be stripped** to bare ground as the photo above suggests. Selectively thin the native vegetation, remove the dead wood, maintain a loose canopy, **without disturbing** the soil.

Once these three basic steps are accomplished, only minimal yearly maintenance needs be done and the reason you live next to nature in the first place is preserved. **The use of goats** as is currently being implemented in some areas to create 200 feet of bare dirt clearance is more of a political response than one based on science. Not only will such

action unnecessarily damage native plant communities, but it fails to address the main reason homes ignite in the first place, flying embers. See our [Human Habitat](#) page for a few more details on goat use.

We have just completed a study of the July 2006 Sawtooth desert fire that burned more than 50 homes in and around Pioneertown, a small community west of Yucca Valley and northwest of Palm Springs. Numerous homes with 100 feet+ of bare dirt clearance burned to the ground. An interesting observation concerning the numerous homes that burned without the necessary survivable space zone relates to the condition of the vegetation around the structure. **In many cases, the only portion of the shrubs and trees that showed fire damage were the sides facing the home. It was the burning structure that ignited the vegetation, not the other way around. A complete report will be available soon.**

No Turning Back...

Once native vegetation is cleared and the soil is disturbed the homeowner is permanently shackled with a number of negative consequences:

1. Continual maintenance costs
2. The introduction and growth of invasive weeds
3. Increased soil erosion and the formation of gullies
4. Surrounding aesthetics seriously damaged
5. Natural habitat destroyed
6. Reduction of native animal life
7. Potential legal costs if "clearance" is done improperly or on public/private land without proper authorization
8. Failure to account for future changes in vegetation management laws
9. Failure to account for changes in personal tastes. Do you think you'll always want your home surrounded by dirt and weeds?
10. False sense of security that "clearance" will prevent your home from burning

The important point to understand about fire behavior and why some homes burn while other do not is that there are *multiple variables* involved. **"How do I prevent my home from burning?" is NOT a one answer question.** While vegetation management will reduce the risk of home ignition, depending on it alone to protect your home in a firestorm is wishful thinking at best. The other thing to appreciate is that no matter what you do, nothing will guarantee that your home will remain standing after a California wildfire. If you live in California's fire-prone environment, all you can do is take steps to reduce risk.

For additional information concerning the personal experiences of others regarding the uneven and confusing enforcement of fire clearance regulations see the [Save the Chaparral](#) blog.

Why Homes Burn

The 1st pdf. file to the right is an excellent study done in Australia about why homes burn in wildland fires.



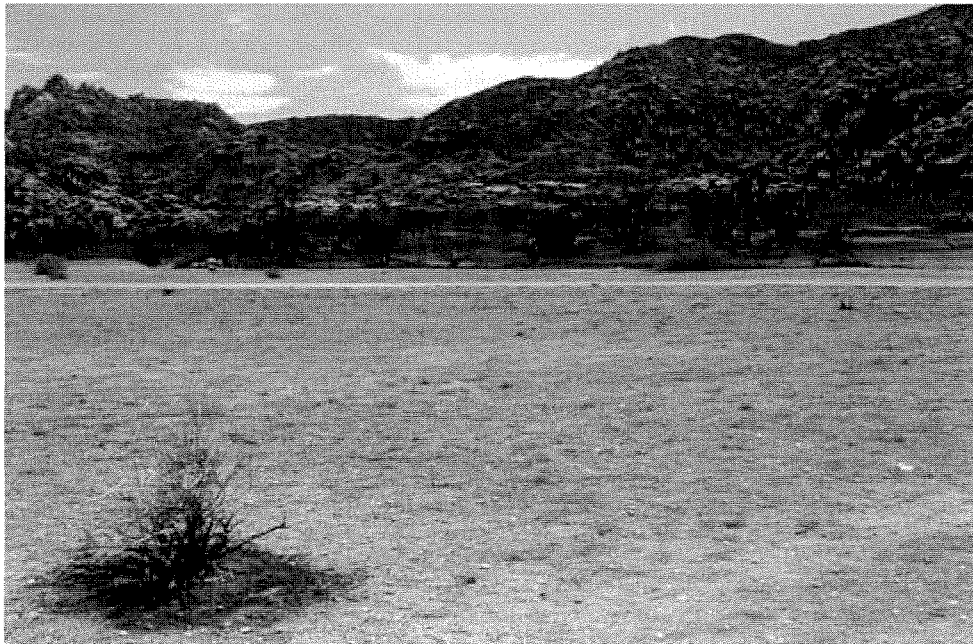
[Why Homes Burn: Lessons from Australia](#)

How to Properly Manage Vegetation

The 2nd pdf. file to the right provides one reasonable plan to reduce fire risk around your home WITHOUT unnecessary, excessive clearing. This was developed through a coordinated effort between fire chiefs, wildlife agencies, and planning departments in San Diego County. The only difference we would like to see in the diagram is an indication that within the 30-100 foot zone vegetation should be reduced to 50% cover rather than what is illustrated here.



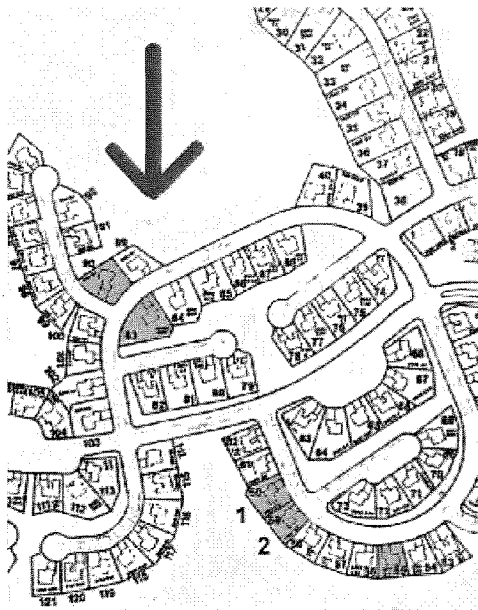
[Proper Fuel Management Around a Home](#)



Depending on clearance? Study this photo for a moment. This is a post-fire scene after the July, 2006 Sawtooth desert fire near Yucca Valley. You can see the termination of the fire front on the blackened ground in the background. The distance between the fire front and the little burned shrub in the left foreground is approximately 250 feet. Why did this shrub burn? Invasive weeds directly under the shrub caught fire from flying embers. Weeds and embers are a dangerous combination that current "clearance" regulations fail to address. Details about this particular fire and the role invasive weeds play in spreading fire can be found in issue #20 of The Chaparralian. To request a copy, please go to our membership page.

EMBER ATTACK

This map shows a development that was heavily damaged by the 2003



**Cedar fire in San Diego County.
Houses marked in orange burned
down.**

The movement of the fire front is indicated by the red arrow. Based on the concept of defensible space, houses 1 and 2 should not have burned down because they were hundreds of feet away from the actual fire. They burned because embers ignited the roof of one which in turn ignited its neighbor.

So...What are California's new requirements for "clearance" around structures according to Public Resources Code 4291?

The new state law passed in response to the 2003 fires in California is confusing to most homeowner's, is poorly written, and its interpretation depends on who is enforcing it. What is demanded by one inspector or "clearance" contractor will be different from what another may require. Some will say "clearance" means just that, down to mineral soil. This is not only a misinterpretation of the law, but has the potential of causing a increased fire risk by encouraging the growth of alien weeds which are much more flammable than the shrubs they have replaced. The resulting erosion of the bare earth will cause additional problems.

What does it mean that you are required to remove all "flammable vegetation" within 100 feet of your home if you live in a very high fire hazard severity zone (usually meaning next to any wild open space)?

1. You are NOT required to remove all native vegetation, but rather remove the flammable material (dead wood and litter) that has accumulated around the shrubbery within 100 feet of your home.
2. Thin ornamental or native shrubs and trees into umbrella-like forms in order to maintain most of the canopy to help reduce the invasion of weeds.
3. Do NOT disturb the soil by disking or ripping out shrubs. This will only allow weeds to invade, creating increased fire risk later on.
4. Vegetation up to 18 inches high in ADDITION to well maintained and trimmed shrubs and trees are allowed within the 30-100 foot zone where necessary to stabilize the soil and prevent erosion.

[Here's the law \(Public Resources Code 4291\)](#)

As of January 1, 2006, there are some important changes made to the above law in order to make the requirements a bit clearer (SB 502: Kehoe). These changes define "weeds" and somewhat remove the bias against native plants.

Know the difference between the law and an interpretation of the law

Home owners in areas subject to wildfire, as defined by state and local officials pursuant to existing state law:

1. Must create a firebreak by clearing all flammable vegetation or combustible growth within 30 feet of a structure, or to the property line, whichever is less.
2. May be required to create additional fire protection or firebreaks within 100 feet of a structure, or more, if ordered by local agencies on larger parcels.
3. May keep, within either zone, "single specimens of trees or other vegetation that is well-pruned and maintained so as to effectively manage fuels and not form a means of rapidly transmitting fire from other nearby vegetation, buildings or structures." Note that ornamentals are not the only trees and plants allowed within these zones. Native trees and plants can be grown if they are appropriately spaced, pruned and maintained.
4. May grow, beyond 30 feet from a structure, "vegetation maintained to stabilize soils and prevent erosion...." if those plants are less than 18 inches high. So, for those with a natural landscape, local officials may not order the wholesale clearance of low growing natives interspersed with native trees and other plants. And clearly, a mixture of natives and non-natives is permissible.
5. May not be required to manage their neighbors' vegetation.
6. May be required to assent to larger fire breaks or fire protection zones by their insurance carriers, however, it does not appear the insurance carrier can require owners to clear all vegetation.
7. Be allowed, if a structure is built from nonflammable exterior materials, to modify or eliminate these fire break and fire protection zones, after exterior and interior inspections and the approval of local officials.

The state's definition of weeds no longer singles out native plants. Weeds now include all plants: (a.) whose seeds are of a "downy or winged nature", (b.) that create a fire hazard to adjacent improved property and certain urbanized but unincorporated areas, (c.) are dry and brittle, (d.) are litter or rubbish, (e.) or are poison oak or poison ivy that is deemed a menace to public health.

- Contributed by the San Diego Chapter of the California Native Plant Society

Here is a copy of the actual CDF approved set of guidelines that turn the law into something you can actually understand. Although some of the suggestions in the guideline pamphlet can be debated (the oak woodland case study photo is a bit extreme), it is a helpful document to assist in providing the information you need to fend off private inspectors who demand you clear the vegetation down to mineral soil.

It is important to remember that this is a state law. Local jurisdictions are allowed to require additional vegetation management procedures. Unfortunately, many of these are based on misconceptions and political inertia rather than science. While most fire departments are very helpful in working with residents to develop reasonable vegetation management practices, there are exceptions. Every law is open to interpretation. Become familiar with your own local ordinances in order to help inspectors enforce them properly.

DISCOVER YOUR HOME'S or COMMUNITY'S WILDFIRE RISKS

To see the latest research on how to prepare for wildfire from the community outward instead of from the wildland inward, see the [ONLINE WILDFIRE RISK ASSESSMENT TOOL](#) from UC Berkeley. Here is the press release for further details:

Fire researchers at the University of California, Berkeley, are launching a new set of interactive online tools to help homeowners, community leaders and researchers assess the risk of wildfire damage to their homes and communities.

The interactive site, officially called the Fire Information Engine Toolkit, debuts today (Wednesday, Sept. 13) and can be found [HERE](#). It was developed by researchers at the Center for Fire Research and Outreach, based at UC Berkeley's College of Natural Resources. Users can type in a specific address to see if they live in a region at risk for wildfires, as well as obtain information about historic fires that have occurred in the area since 1950.

Homeowners can also use the site to get a science-based assessment of their vulnerability to wildfire based upon the answers they provide on an online form.

"What's new about these tools is that homeowners and community officials can get an individualized assessment of a specific building's fire risk based upon such factors as the material used in their roof construction or the density of vegetation near the structure," said Max Moritz, UC Berkeley cooperative extension wildland fire specialist and lead researcher for the fire toolkit project. "The toolkit then provides immediate feedback that helps identify areas where people would get the biggest payoff in mitigation." "There are no other sites like this that allow people to get suggestions for reducing fire risk that are targeted to their own homes," added Faith Kearns, associate director of the Center for Fire Research and Outreach.

The researchers reviewed a number of the most widely used fire hazard ranking methods - each dealing with different risk factors including dense vegetation, installation of attic vent screens, or the width of the roads leading to the homes - as well as the latest wildfire research to create one comprehensive risk assessment tool. In addition, the researchers are utilizing geographic information systems (GIS) and Google Maps to display fire hazard information.

Locations of major wildfires active within the previous week are also mapped on the fire center site, and readers can link from there to recent fire-related news stories.

Local officials and decision makers can also download forms to complete a community-wide assessment on fire risk, and easily upload the results to a Web map. Such information could be used to plan education and risk reduction campaigns, the researchers said.

"One of our goals with this project is to raise grassroots awareness of the fire risk of one's home or neighborhood among the public, since we are ultimately most concerned with the loss of lives

and property in fire-prone areas," said Moritz.

The site contains useful information for fire researchers, as well. Scientists can get background information on fuel models and fire behavior, and download the HFire computer modeling software used to predict the speed and direction of fire spread. The program, developed by Marco Morais when he was a graduate student in geography at UC Santa Barbara, can also be used for multi-year simulations of wildfires.

Some Final Thoughts on Overreactions

After every fire there are predictable editorials calling for excessive clearance around homes, blaming wildfires on environmental regulations or the "greens", and demonizing the chaparral. Fortunately, the public usually sees through these misguided opinions and responds with letters to the editor. Below is a sample of such citizen action. The original editorial can be found below the letters.

Trimming chances for another firestorm (SD Union-Tribune 1/6/07)

Your editorial, "No brush-off, please/'Defensible space' bill deserves a close look" (Dec. 30), ignores the real problem – embers traveling up to a mile. Experts say houses have 95 percent survivability with 60-foot clearance. Houses that do burn are built in high-risk areas, such as canyon tops, or are ignited by embers.

You ignore what governments should be taken to task for – lax codes allowing building in extremely risky areas. You foolishly encourage people to clear to 300 feet when they should be examining the first 30 feet to prevent embers from igniting their homes.

JANET SHELTON
Escondido

Fuel for thought: Good for us to have funds to reduce risks, so why not use them to reduce the big risks? The majority of home losses in the Witch Creek fire were due to embers getting into houses, not due to the nearby plants igniting the house. If we manage fuel (shrubs, plants, trees and man-made flammable stuff) out to 100 feet, fire science predicts that flames won't be long enough to ignite a house. It is smart to manage fuel in this area – as long as all the other work to make the house safe from embers is done, too.

Cutting down shrubs beyond 100 feet costs more and gains nothing. Worse, if the dead weeds are not cleaned up, we risk more, not less, embers and flame. Better spend the money on the house and yard, then out to 100 feet. Look past 100 feet if there is any money left.

KAY STEWART
San Diego

Regarding "Pound foolish/Brush management gets the brush-off, again" (Editorial, Jan 2):

On behalf of Friends of Mission Hills Canyons, suggestions of massive clearing of native shrublands are extremely shortsighted and have been shown to create even more problems: increased erosion and water pollution, decimation of local wildlife and increased – not reduced – fire potential. The editorial states, "Most homeowners would prefer no flammable plants within sight of their house." Is this why homes on the canyons and open space areas of our city are among the most sought-after real estate we have?

Virtually all plants are flammable under the weather conditions during the last fires. Clearing

native shrubs would result in its replacement with even more flammable, weedy flash fuels, with even higher maintenance costs.

Regarding the statement "there was once no chaparral here" – where did that come from? Chaparral and the very similar coastal sage scrub community were once the dominant habitat throughout what is now the city of San Diego, and the remnants of it that are left are still the best and only practical vegetation choice for our open space areas.

The brush management guidelines, if followed carefully and enforced, coupled with fire-resistant building practices, would greatly reduce the vulnerability of our homes to wildfires. Some may find the rules confusing, but that is true of most regulations when one is unfamiliar with the subject.

Building codes also seem arcane, arbitrary and confusing to the uninitiated, but they serve a similar function: good building practices result in a safer community for us all. The brush management rules are not those that "favor every species except humans"; they favor us humans being able to successfully live in the San Diego environment and preserve the natural communities that help make our city unique and desirable. Your suggestion that they be thrown out or ignored does a great disservice to our community, and would not, in the long run, save lives, property or money.

STEVE HUEMMER
San Diego

12/30/07 UNION-TRIBUNE EDITORIAL

No brush-off, please 'Defensible space' bill deserves a close look
December 30, 2007

In the aftermath of the devastating 2003 Cedar and Paradise wildfires, state Sen. Dennis Hollingsworth, R-El Cajon, introduced a measure that would allow property owners to construct a firebreak with a radius of up to 300 feet around homes or other structures - irrespective of most city or county regulations. This followed one of the recommendations of Gov. Arnold Schwarzenegger's Blue Ribbon Fire Commission, which concluded that chaparral and other flammable brush near homes were a major reason for the vast destructiveness of the Cedar and Paradise blazes, which killed 14 people and consumed 2,400-plus homes.

Unfortunately for Californians, Hollingsworth's "defensible space" bill quickly became enmeshed in environmental politics.

Green groups reluctant to surrender any government authority over private property raised a variety of objections. The Sierra Club and the Planning and Conservation League described the measure as an "over-reach" with potentially "dramatic adverse impacts on the environment." The groups supported a 100-foot-wide radius and said that was all that was needed to keep homes safe.

On its own, the staff of the Senate Committee on Natural Resources and Wildlife came up with another objection, warning that the bill could be a pretext for large-scale commercial logging. Between the power games of the greens and the paranoia of the Senate staff, Hollingsworth's bill never got the thorough consideration one would have expected, given the staggering toll of the Cedar and Paradise blazes. Instead, in April 2004, the measure died on a 4-4 committee vote, thanks to the opposition of four Democrats from urban areas - especially Sheila Kuehl of Santa Monica.

Now the San Diego area has suffered through its second horrific October in five years, losing 1,700 homes to wildfires, and Hollingsworth is once again seeking to give homeowners the chance to better protect themselves. This time, we hope the proposal gets a full review, and that environmental groups don't see the measure as part of a zero-sum game in which any concession on any front is a setback.

If this view seems uncharitably cynical about the greens' motives, consider the fate of another bill related to firebreaks. The 2006 measure - approved without objection - allowed fire bureaucrats to OK the establishment of a 300-foot-radius firebreak around schools, storage tanks and adult residential care and hazardous materials facilities.

What about the 2004 argument that a 100-foot-radius firebreak was all that was needed to limit fire risk? That was conveniently forgotten. Some structures deserve more protection than others, you see - the ones where bureaucrats control decisions on firebreaks, not individual homeowners.

This may seem perfectly acceptable to someone who lives in the cement jungle of Santa Monica, but it's not to the millions of Californians living near wilderness areas. We hope the Legislature understands this - finally.

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EXHIBIT 10

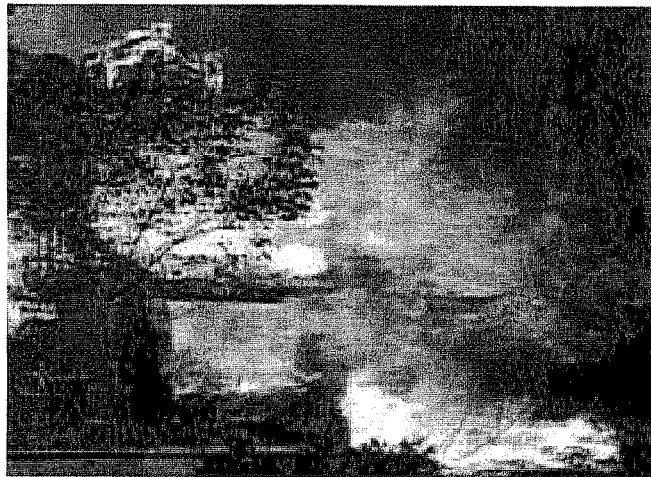
CITY OF SAN DIEGO FIRE-RESCUE DEPARTMENT



cedar fire 2003



after action report



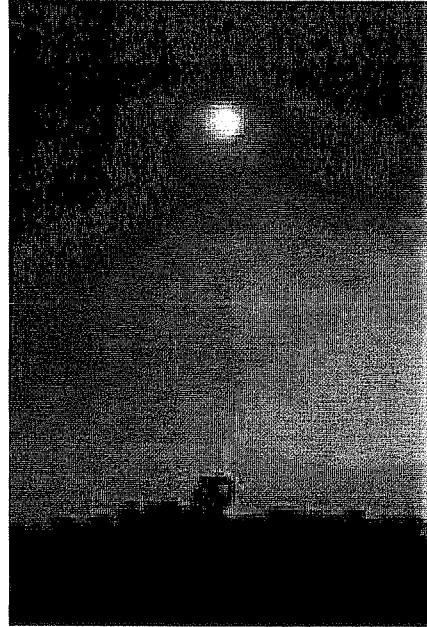
Jeff Bowman
Fire Chief

June 2004

Conclusion

The Cedar Fire has been determined to be the most destructive fire in California history. While the Cedar Fire had a devastating effect to life and property, this significant countywide disaster did provide a valuable learning experience, which cannot be replicated in the classroom. The SDFD had an opportunity to exercise its ability and capacity beyond what any drill or exercise setting could present. There were countless lessons learned at all levels of SDFD.

The Cedar Fire validated that the SDFD is underfunded, under-staffed and inadequately trained to respond effectively to complex incidents for extended operational periods. SDFD senior management has historically documented that continued budget reductions, deferred apparatus purchases and maintenance, and lack of staffing to keep up with community growth would have serious implications in its ability to respond to emergencies.



SDFD senior management will review the issues and recommendations contained in this report. Issues that require action will be prioritized and integrated into the senior management and strategic plan initiative process for resolution.

Despite the lack of apparatus, equipment, and staffing, members of the San Diego Fire-Rescue Department rose to the occasion. They provided support, via the State and Local Mutual Aid System from East County to San Bernardino during this memorable period in California's fire history. SDFD personnel, both uniformed and non-uniformed, from support personnel to line fire fighters, all gave their best effort in protecting life and property and providing services to the community during the Cedar Fire.

The SDFD is committed to take the lessons learned from the Cedar Fire and apply them to improving all risk planning, preparedness, and response and recovery efforts. Though many of SDFD personnel may never again see a local disaster of this magnitude, we will never stop preparing for and improving our levels of service to the community we serve. SDFD will do the best it can within existing resources to accomplish this. SDFD will also continue to request additional funding and resources that are needed to protect our citizens and our personnel.